The Builder.

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The Railway Moloch.

PAINFUL and distressing are the accounts, flashed week after week over the wires of the telegraph, of fatal and disastrous occurrences, called by the name, not always strictly correct, of railway accident. Railway calamities they certainly are;—calamities to the corporate body of shareholders as well as to the individual sufferers. But in the use of the phrase "accident" there is, consciously or unconsciously, a begging of the question. Accidents, properly so called, are casualties that arise from causes beyond control. At least it is in that sense that we generally use the term. Injuries to life or to limb that arise from carelessness, or from causes that ought to be, but are not, within control, are not true accidents, but offences. In the case of the gravest crime, except treason, known to our law, a person may be brought under the penalties of *murder* for a sheer act of wanton carelessness. When disaster follows disaster, under circumstances that have a certain family likeness, the question will force itself on the mind,—Is this the result of negligence or of incapacity? Have we, as a civilised people, neglected to take the proper precautions to protect life and limb, or are we, as an educated people, in a state of too great ignorance to know what precautions we ought to take?

We use no editorial plural. We speak of ourselves, meaning the English people. The question of personal safety, in the only mode of travelling by which long distances can now be traversed, is one that comes home to everybody. Few are there among us to whom the large black letters,—now, alas! but too familiar to the eye,—in which the damp placards that dangle at the railway stations or look up from the mud at certain well-known street corners, tell of "Terrible Railway Accident," or "Fatal Railway Accident," or "Another Railway Accident," do not cause a thrill of alarm, or, at all events, of pity. A lesson is thus given to the dullest; and an alarm, used in its real sense, *à l'arme*, to arms,—to the most intelligent and to the most courageous.

The press is almost mute, in face of the magnitude of the evil. Mute, that is to say, as far as practical and hopeful counsel is concerned. Enough, indeed, is *said*, but people are hardly sufficiently aware how sure a method of concealing an evil it is, to envelope it in a cloud of words. There are no means of choking off an unwelcome inquirer that are at once more plausible and more effective than to smother him in details. So it is in the present instance. What is the cause *this time?* is the inquiry. Are the "points" ill constructed, or out of order? Is the signal-man to blame? In what minute detail has the enormous and delicate mechanism of the railway system failed this time? In this sort of inquiry time may be absorbed till the public attention is wearied; and with what result? Generally with the satisfactory one,—to some persons,—that the cause of mischief was altogether exceptional. It was something that has been hitherto overlooked, and that will be attended to in future; something that has always been weak, but will now be made strong; or something that, as its nature eludes all attempts at detection, is, of course, never likely to occur again.

Let it not for a moment be supposed that we are about to attack or to depreciate the railway system of this country. Nothing can be further from our wishes. In every way we have a right to feel, to a great extent, proud of that system. Every Englishman feels, or ought to feel, an honest pride that Watt, Stephenson, and Brunel were his countrymen. We say Brunel, because England claims, and indeed numbers among some of her greatest benefactors, many of these families, of French origin and name, who were driven to her shores by the intolerant cruelty of priest and king combined, and to whose members her stormy and uncertain climate seems to have imparted the sturdy perseverance of her own children, without depriving them of the brilliant qualities which they brought from the land of their birth. That English enterprise should have carried to so admirable an excellence, in comparatively so short a time, the machinery used for producing rapid locomotion, by land and by sea, is matter of just satisfaction for Englishmen. And to those of us who have stood by the very cradle of the locomotive; who have heard its first whistle in many a fair county throughout the kingdom; who have witnessed the open-eyed awe with which the rustic population came out to watch the strange advent of the iron horse; who have, may be, accompanied the last journey of the once cheerful and well-appointed stage; and who have yet fresh and pleasant reminiscenses of postchaises-and-four; the locomotive has that sort of fascination which is exerted over a man by the horse reared in his own establishment. Every fresh triumph is a cause of self-congratulation. Our speed, our comfort, our cheapness, all are admirable. And although we believe, and have before expressed the opinion, that we are yet at the first, rather than the last, letter of the alphabet of mechanical progress; that we have, in many respects, been really at work in the wrong direction; and that the railway system of 1973 will be as unlike that of the present year as our actual arrangements are unlike those that prevailed a century ago; this does not prevent us from admitting that we have made a wonderful progress during the last fifty years.

Again, it is perfectly true that the percentage of accident, or calamity, taken as regards the actual number of travellers, is small,—far lower than that by any other method of conveyance. When last we looked at the statistics of this question they showed that the mathematical expectation of accident was less to the traveller who set out on a long railway journey, than to him who set out on a stroll from Hyde Park-corner to St. Paul's Churchyard. It was far more likely, as matter of figures, that a man should be knocked down and run over at a crossing in the streets of London, than that he should come to any harm on a railway,—if he followed the simplest rules of care. And, whatever may be our personal experience, and however distressing individual calamities may prove,—we must always bear in mind that safety, in proportion to the number of passengers conveyed, is a marked characteristic of our railway system. The question is,—can that safety be made absolute? And if not,—why not?

The rate of average and percentage explains the comparative immunity from accident of foreign lines. Comparative, as far as the returns that reach us go. Comparative, more certainly, with reference to the actual number of passengers. For it is well known to those of us who are familiar with the Continent, that the care and respect shown to the English railway traveller by the officials and servants of the railway companies, as a general rule, are unknown across the Channel. On many a line in France or Italy, or Germany, the unfortunate passenger is dealt with as if he were a criminal. He is locked up in a pen, into which he is compelled to enter,—at all events if he has any luggage,—perhaps fifteen minutes before the time for the starting of the train. From this pen the inmates are hurried, like so many convicts, by the imperative and contemptuous command of some semi-military official. If delicate health or advanced age require deliberate movement,—if youth and inexperience are in doubt which way to turn, the sharp, shrill, angry "*Sortez, messieurs, vite! vite!*" of the conductors does not mend matters. All that we are spared. All that is, perhaps, only possible among people who are enamoured of a kind of liberty and fraternity that have never taken root in England. Most haste, quoth the proverb, worst speed. There are haste and hurry enough on the French railways. But for speed, commend us to our own,—for speed, and for safety too. For, in spite of the great severity of the Code Napoléon,—and we have known a French engineer-in-chief of the highest eminence condemned to *fine and imprisonment* because an accident happened on a line of which he was engineer, although he was in no way cognisant of the circumstances of the special case,—the comparative safety of the passenger we believe to be greater in this country,—fewer individuals, per million, of travellers, are killed or injured, than on the Continental routes.

Per centage, however, may be differently regarded; and there is a very important difference, which lies at the root of the question of safety, between a rate per thousand and a rate per million, if the thousand and the million are regarded under different conditions. Thus, if the arrangements of a steamboat were such as to convey with perfect safety say 300 passengers, the risk of the trip would be considerably enhanced if 600 were crowded on board. We could analyse, in this instance, some of the reasons why this should be the case. We should find the vessel to be submerged below the proper line of flotation; undue stress would be thrown on every part of the propelling machinery; the signals of the steersman would be liable to interruption; some foreign object might be thrown down into the engine-room. In a dozen ways we may see that the danger *per cent.* to the 600 passengers would be appreciably greater than to the danger *per cent.* to the 300.

The same rule prevails in our railways. There is a certain maximum amount of traffic which each line can convey without strain. Augment the amount, and you put on strain. Where this strain will tell is probably unknown. It will find out the weakest place; and then occurs what we call accident. We ought no longer to deal with the cause of that individual accident, like the physician who sets himself to deal, not with a disease, but with symptoms. We want to go to the root of the matter.

The occurrences of railway calamities in this country are chiefly notable at two periods of the year. The most serious are those of the augmented summer traffic and of the blinding November fogs. In the first case we see a direct addition to the strain to which the system is exposed. Every portion of the great machine has to work harder. Every porter, switchman, guard, or other servant has, if not to work for longer hours, at all events, to do much more while he is actually on the service of the line than at other times. The jaded aspect of the men tells

this story pretty plainly. Every carriage has to carry more weight; every engine has to draw a heavier load; every joint and fitting of the permanent way has to undergo more service,—in a word, the strain is increased, and often enormously increased, everywhere; and so the weak point is found out, but found out by a fatal calamity.

One portion of the remedy for this evil lies in the hands of the companies themselves. Of that we have not now to speak. It would be idle to attempt to prescribe rules, which must either be so general as to be vague, or so special as to require special knowledge of each case to which they should apply, before attempting to frame them. Not to overtask the men; not to underpay them; — not to attempt a false economy,—in a word, not to be greedy, is the first of those laws of action for the managers of all railways, which are imperatively called for by the public safety. But, having enounced this general law, the application of it must be left to each individual authority. It is only in some case of terrible break-down from the over-driving of the *personnel* of the railway (a case, indeed, which is far from rare), that public indignation is aroused, and that directors are taught that there is such a thing as penny wisdom and pound folly.

But we come to a more practical matter,—to one in which, in our deliberate opinion, legislative intelligence is not only proper, but necessary.

We have seen that either great augmentation of traffic, or such diminution of the natural powers of a system to convey traffic (as in the case of fogs, rendering slackness of speed necessary) as comes to the same practical result, may be taken as a *predisposing* cause of railway casualties. Next, we find that the main *effective* cause is the collision of trains. It is a natural inference, that we ought to inquire how it is — not that collision is not avoided, but that it is possible that it should occur. Were we working out a railway system on paper, one of the postulates would be that, under the arrangements proposed, collision should be impossible.

When two tracks of railway are laid side by side, at a distance of only a couple of yards apart, it is clear that if a train running on one of them is thrown off the rails, the carriages may so fall as to obstruct the other line of way, and thus to be run into by a train on that line. This kind of collision has occurred, but it is now extremely rare. It is the result, when it does take place, of the failure of some element either in the first train, or in the first line. If the wheel of an engine flies, if an axle breaks, or if the plate-layers have left a hole in their work, this accident may occur. It is to be guarded against by a careful inspection, both of way and of rolling stock, and in point of fact, it is not a danger that we believe now to be very pressing or alarming.

The most frequent causes of collision some years back, were single lines of railway. That such should be the case was almost incredible. It may be added that it was totally inexcusable. This has been tacitly admitted. By the constant use of the telegraph, and by the adoption of the block system, this cause of what formerly were frequent accidents have been brought, as a rule, under proper control. It is a cause, moreover, which moral considerations affect. For it is surely fit that the utmost severity of the law should visit such departure from well-known rules as alone renders collision on single lines possible. And in this severity there will be a great safeguard for the public.

We come, then, to the sore place at last. Over-traffic,—over-stress of some kind is the predisposing cause. Collision is the active cause. When and how does collision occur? Not, as a rule, from the breakdown of trains; not from the use of single lines. It occurs, in the great majority of instances, from the passage of *two lines of traffic*, in different direction, *over the same spot*. If we prevent this, we shall prevent collision; or at least we shall so far reduce the possibility of its occurrence as to render it almost a *lusus naturæ*.

Can this be done? the reader who is not an engineer may ask. Certainly and absolutely, is the reply. It is a question, not of engineering contrivance, but purely and simply of expense. "Do you mean," our querist may proceed, "that structural arrangements are within the skill of the engineer to effect what shall render collision, from what we may call the usual cause, impossible?" "Certainly, is the reply. "And that the non-adoption of such safeguards is a mere question of saving money?" "Undoubtedly." Such is the real state of the case; let the men who act as jurors on coroners' inquests once get thoroughly hold of that truth, and railway collisions will cease to disgrace the civilisation of the day.

It is no mere matter of theory or of opinion that we now, and that not for the first time, bring forward. When the railway system was first introduced, extreme care was taken that ordinary highways should not be crossed by the locomotive on the level. Bridges were almost everywhere built to carry the road over the railway, or the railway over the road; and, speaking at a venture, we may say that at least a third of the cost of the formation of what are called the works of our railways (not including the metal way) was caused by the rule that railway and road traffic should only cross *on different planes of elevation*. Then collision was impossible. In some places, where traffic was small, the right to make a level crossing was fought out in committee; but a lodge and a permanent porter were, in those cases, made imperative. What is the resulting experience? We cannot cite a single instance of collision between road and railway traffic that has taken place at a bridge. All that have occurred, and the total will be found to be considerable, have taken place at level crossings. And with this plain truth staring us in the face, we allow one railway to run across another, or to run over its own lines, in a manner to render collision possible; if we ought not rather to say, to render its prevention matter of extreme difficulty.

We have an example of how this may be avoided, and is avoided, in the Victoria Station. A perfect web and tangle of railways converges on that metropolitan centre. Looked at from a balloon, it would seem as if they had been planned for the very purpose of homicide. But there is a method in their madness. Viewed on the earth, they will be seen to occupy three distinct planes of level. We believe that it is to the ingenious suggestion of an engineer to whom England owes many useful inventions,—Mr. J. C. Haddan,—that the arrangements are to be attributed. It was by the long experience, and tried mechanical ability, of Sir Charles Fox, one of the few surviving assistants of Mr. Robert Stephenson, that they were carried out. But the fact is, that the numerous inlets and outlets of three great main lines, and we cannot tell how many branches and loops, that come into the Victoria Station, are so carried above and below one another, that the ordinary cause of collision is removed, and that, come fine come fog, the trains may run at full speed, confident that they shall not cut into one another at some half-turned switch or ill-signalled crossing.

We do not of course say that in a terminal station it should be impossible for a proper exchange of carriages to be made from line to line. Where a slow speed is invariably maintained, we think it permissible; but in any case where rapid *through trains* at any time pass, we hold that it should be absolutely prohibited so to lay the way as to make collision possible. In one case of a well-known metropolitan line, where another crosses on the level just without the terminal station, we think that the authorisation should have been refused by Parliament. It is a case where, now, most of the trains stop or move slowly. But there is no safety in the word "most"; safety lies in all or none.

If in the costly precincts of the metropolis, where a paving of silver, if not of gold, would not equal the money-value of the area of the ground it covered, it has been found practicable to carry railways on different planes, and thus to remove the danger of collisions; if in the cases we name the wise and salutary rule of structural provision for traffic has been substituted for that reliance on human care and industry, which generally results, sooner or later, in disaster; what can be said as to great stations and junctions in the country? Take an actual example. A well-known station is so planned that the down trains from London, running on the left-hand of the line, have their platform on the same side of the railway as that which it is also employed for the up-trains to London, the two not being, as is usual, on the right and left hand of the main line, but both of them to the south. This is not an imaginary example. The case is further complicated by the entrance of branch lines close by. Now, in all stations of this nature, if we take the number of trains running through them each day, we shall find the mathematical expectation of collision to be very great. Constant care and skill may prevent mischief. It may be the case that no accident has ever occurred on such a spot as we have in our mind. But the application of a certain amount of skill and of cost would provide such courses for the several streams of traffic as would render collision as impossible as in the case of a road bridge. Ought this precaution to be neglected because of its expense? That expense, no doubt, would in some cases be considerable, but it would be incurred once for all, and in very many cases, it would be recouped within no very long time by diminution of the costs for the damage and legal expenses to which the companies are so constantly liable?

So many lives for 1,000*l.* sterling? We have before suggested that sanitary authorities were in doubt as to the solution of that equation. We fear it is the case with some other authorities. If it be true that, in a recent case of disaster, the company had one station-master, whose hours of duty extended from six a.m. to half-past nine p.m.,—that is, one man from whom, for the pay of one man, they demanded the work of two,—we think that the persons who authorised the time-sheet and the pay-sheet deserve that the notice of the CORONER should be turned in their direction. If "manslaughter" should be a verdict in such a case, we should be disposed to attribute to the Directors of the line the first degree of blame, to the fifteen-hours-and-a-half-per-day official only the second.

THE BRIGHTON NEW FREE LIBRARY AND MUSEUM.

THE sleeping population of the City of London is constantly diminishing, as appears from each successive census, but the day population keeps on the increase. In 1861 the sleeping population of the City proper was 112,063; whereas in 1871 it had sunk to 74,732, with a day or occupation population of many times that number. Even in such districts as the Strand, St. Margaret's, and St. George's, Hanover-square, considerable reductions in population were shown by last census. Other districts, however, especially suburban,—and London's suburbs have long stretching radii,—show a large increase in the population. Brighton, otherwise London-*super-Mare*, can scarcely be regarded as a suburb of London, but it is, *par excellence*, the seaside resort of the Londoners, and the kaleidoscope population of Brighton presents probably more curious phenomena than those of almost any other town in the United Kingdom. In 1801 the population of Brighton was 7,339; in 1861, it had risen to 77,693; in 1871, it reached, with the western suburb of Hove, 101,232. These figures do not, however, give an accurate idea of the summer and "season" population of Brighton. The last census was taken on the 3rd day of April, 1871, as for several past decades the census has been taken at the beginning of that month. The contrast between the population of Brighton at the beginning of April, 1871, suggestive of the bleak and dismal, and the population of Brighton at noon of any fine day in September, 1873, is very remarkable. The sleeping population is probably trebled, and the day population quadrupled, at the one period as compared with the other. If it be asked concerning the enormous increase "whence, and for what come they?" it may be answered broadly from London, and for change of scene and circumstance, and for recreation. Well, change of scene and circumstance the visitors are sure of, but what of the recreation? Both piers are open, and promenading can be done to one's heart's content, excellent music being discoursed on the west pier; there are brilliant shops, equal to many in Regent and Oxford streets, London; there is the Aquarium, with first-rate music again, and the best institution of the kind in the world, to which, by the way, important additions have been made and immense improvements effected in the course of the last twelve months, as witness the additional sea anemones, the sturgeon, the seals, the porpoise, the alligator, and divers other wonders of the waters. Failing satisfaction from pursuit of these means of catching pleasure on the wing, there are the rival "town bands," the Ethiopian serenaders, and a trip to the Devil's Dyke, and this exhausts "doing" Brighton. No, we had forgotten the ever-delightful recreation of reclining upon the shingle and shying, with a number of stones, at one particular stone, or of throwing stones in rapid succession without aim into the ever-restless sea, watching the while the rising tide.

But having done all this,—the lounging on the parade, on the piers, and at the shops; having done "the Dyke," and the Aquarium, and the stone-throwing, what is left for a visitor? Not much. It is well that the corporation of Brighton should take an anxious and enlightened view of this inquiry, as they seem to have done, by the establishment of a Public Free Library and Museum.

Few public or private buildings, or properties of note, have undergone more remarkable, and withal salutary, changes in their character, and the uses to which they have been applied, than the Brighton Pavilion, absurdly fantastical in design, and worse than foolish in the uses to which it was originally applied. The Pavilion, with the outhouses and grounds, were purchased from the Crown by the corporation of Brighton in 1850 for 52,000*l*. The investment was an excellent one for liberal municipal authorities to make, although it may not give promise of directly "profitable occupation" in all the uses to which the property is applied. The Pavilion proper is used for corporation and other public purposes, and part of the premises are leased to the Brighton School Board. The grounds are thrown open to the public as a people's garden; and the conversion of the stables, stable-yards, and coach-houses, to the purposes of a Public Free Library and Museum, is on the point of completion. If the corporation has desired to promote the interests of the people of Brighton, and to continue or increase the attractions of the town, they could not have done better than by instituting the New Free Library and Museum and Picture Gallery.

To those who know nothing of the Pavilion and the grounds, and what were formerly the stables, coach-houses, and their adjuncts, it is difficult to convey a correct idea of the transformation that has been made. The Pavilion, or royal residence, stands distinctly, although not widely apart from what were the stables, coach-houses, riding-school, loose-boxes, and what not, that are in a separated group of buildings. Between the Pavilion and the stables there was a subway that allowed means of communication between the one place and the other, without the necessity of stable-men, on the one hand, or the august occupant of the premises, or his valets, on the other, appearing in the grounds. This subway, 8 ft. high, it may here be mentioned, has been utilised as a chamber for warming and ventilating the New Library and Museum, which are part of what were once "the first gentleman" &c.'s stables and coach-houses, much of the space now utilised for such a grand purpose having been open to the sky during the original occupation.

The skilful adaptations of what may be called the stable buildings of the Pavilion, are highly creditable to Mr. P. C. Lockwood, C.E., architect and surveyor to the corporation. The style of the Pavilion—if it has a style—may be pronounced a sort of bastard or outraged Moorish, to which Mr. Lockwood was bound to conform as far as he could do so with self-respect. His adaptation may be pronounced a species of modified Moresque.

It is intended that the entire suite of rooms that are now converted from stables, &c., which include the rooms of the free library and museum, should be connected, and a general reference to the premises should include notice of the whole, more or less particularly. The dome, originally the stable, which furnished stalls for forty-eight horses in the time of the Prince of Wales, afterwards George IV., has been converted, with abundant decorations, into what singers and musicians pronounce a capital concert-hall, the acoustical qualities of the space being very good for first-class singers, but very bad for third-class orators, who fail to keep *en rapport* with their audiences. Mr. Lockwood was concerned in turning this grand rotunda to account to make it permanently available for public uses at the smallest cost in first outlay and for maintenance. When he took it in hand, the light received was from dull green glass. He introduced stained glass groups, arranged between the rib spaces of the dome, and above these, at a sufficient height not to obstruct the play of light, he fixed an upper and outer glass roof. The effect is entirely satisfactory, in obviating either the manipulation of blinds, rendered unnecessary, or the cleaning of glass. The party colours and gilding of the dome remain at the end of seven years absolutely untarnished. Great changes have been made in this rotunda in construction, as well as in decoration, as any one would detect who visited it now, and was present in it about two years ago, when it was temporarily used as a place of worship. The inner periphery was then enclosed by felt curtains. It is now opened out, and the grand diameter of the dome is 124 ft., with a diameter between the pillars that support the front of the galleries of 80 ft. The hayracks of the stables remain, only appropriately coloured.

Another fine room, with which the dome is to be brought into immediate connexion, is what was known formerly as the Riding School, but is now used as a corn exchange. In this hall, 172 ft. long by 72 ft. wide, the British Association held their aggregate meetings in August last year; some of the decorations are still remaining. The rooms, even as they existed then, gave most satisfactory accommodation to the Association for its aggregate and sectional meetings.

The entrance to the New Library and Museum is from Church-street, by a pair of cast-iron gates. The entrance-hall is about 25 ft. long by 16 ft. 9 in. wide. To the right and left of the entrance-hall are committee-rooms, 29½ ft. long, the one to the right 22 ft., and the other 18 ft. 5 in. wide. On the left of the entrance-hall there is abundant accommodation in the way of closets and lavatories.

The central hall is 115 ft. long by 80 ft. wide, and is a splendid apartment. It is lighted entirely from the roof, which is double; the ribbed glass employed for the outer roof entirely prevents glare. At each end of the central hall, a space, under the galleries, of about 12 ft. wide, is laid with parti-coloured tiles.

The rooms to the right of the central hall, and ranging with it, are three in number on each floor, and respectively 31 ft. 5 in., 24 ft. 9 in., and 41 ft. 10 in., in length. These (six) rooms are on the ground and first floors, the same in length, and all about 19 ft. wide. To the left of the central hall, on the ground floor, there are two library rooms, each 50 ft. long by 20 ft. wide. These rooms are already filled with excellent standard works, and many scarce, curious, and valuable publications, all inclosed in oak cases glazed. The cases secure the advantages, amongst others, of preventing the abstraction of the books and of defending them from the injurious effects of the products of combustion. The books collected, as yet, are almost entirely contributions. Amongst the contributors are Dr. Ormerod, who has given a very large and fine collection of books; the Rev. Henry Venn Elliott, from whose excellent library book-cases as well as books were received; and Mrs. Richard Cobden, who has contributed a unique collection of the works of others and the writings of her late eminent husband. The stock of the Albion reading-room and library has also been acquired by the Corporation. The reference department will be rich in the possession of publications that cannot be purchased. Amongst others, we noticed a valuable collection of London and provincial directories; forty volumes of the *Times*; fine sets of Lords' and Commons' journals; vols. of collated newspapers from the introduction of the Reform Bill, March 2, 1831, to the prorogation of Parliament, April 22nd, 1831; newspapers "Annus Terribilis," 1848, 2 vols., that include a great variety of papers of the period, carefully collated, including numbers of the *Times*, *Le National*, the *Illustrated London News*, the *Historic Times*, *Daily News*, *Standard*, and numerous other papers, furnishing valuable materials for a history of the French Revolution of 1848.

Before disposing of this portion of the subject we feel disposed to say that, in our opinion, in the allocation of space, the library, as compared with the museum, has scarcely had its fair share allotted. For visitors, the museum will be of course the chief attraction, but the permanent inhabitants of Brighton, the ratepayers in a word, have to be cared for primarily by their local representatives; and the library, in its lending and reference departments, is the portion of the institution most likely to be useful to them.

It has been already stated that to the right of the central hall there are, on the ground and first floors, six rooms, three on each floor. The library-rooms above referred to as on the ground-floor have over them two rooms of the same size devoted to museum uses. They are each about 50 ft. long by 20 ft. wide. Communicating with the museum galleries there is a fine room, available for lectures, concerts, or other purposes. It is 60 ft. long by 29 ft. wide, and has a double roof. In fine, the central hall has one floor, that is lighted from the roof, and gives an excellent light for the exhibition of paintings, sculpture, and other works of art; it is surrounded on the ground-floor by library and museum rooms, and on the first floor by rooms of like dimensions, the two end rooms being as galleries of the central hall. The west side of the museum and library rooms adjoin the parochial offices, and Mr. Lockwood has, on that side, obtained his lights from glass roofs, and wells for the ground-floors of the three museum rooms. It is intended to make a communication between the museum galleries and the galleries of the dome, which can be easily effected. The whole of the spacious rooms we have named will then be in direct communication with each other.

The museum will open very strong in various departments, and is especially rich in fossils from the chalk formation, with very good collections in general natural history, including ornithology, ichthyology, entomology, and the other branches.

The Brighton Free Library and Museum is *not* established under the provisions of any existing Acts, but is provided by and is under the control of the corporation. The contracts, signed 18th October, 1871, are principally with Messrs. V. P. Freeman and C. & F. Cheeseman, for 6,300*l*. The total cost of the works will be something less than 10,000*l*. The lighting of the building will include 983 lights in all. The central hall will be lighted by two rows of burners, 756 in all, from a 1¼-inch pipe run along under the roof. A basement chamber in the north-west corner accommodates the boilers for warming the rooms. The contracts have been executed under the direction and authority of Mr. Alderman Lester, chairman of the Pavilion Committee.

The Free Library and Museum are to be publicly opened on the 8th of September.

STREET IRON RAILINGS AND STREET ARCHITECTURE.

IT has been often enough remarked that things always in sight are not very curiously looked at, and do not obtain that amount of attention which they sometimes well deserve. It is a trite remark, and if ever it should stand in need of proof it would be found in the scant notice given to the common *street iron railings*, whether ornamental or plain. It may, perhaps, be difficult to account for this, for it is impossible to move a few yards through London streets without seeing, and even tumbling up against them. Other things, whether architectural or not, may be avoided, and passed almost unseen, but the "railings" cannot be. And, more than this, there is a fashion growing up to make of these hitherto plain and unornamented objects works of art, and no small items of expense. Indeed, if we look closely to the matter, it will be found not a little significant of the tendencies of the time, and indicative of the way in which its *artistic* energy exerts itself. We have been at some pains, and spent some little time in the effort to grasp the railing question; and it may interest a thoughtful reader here and there to follow us in our inquiries. They are not a little curious, all things considered. The ordinary house area railing, as everybody knows, was, up to very lately indeed, a simple square bar of iron, let into a stone curb at its base, and kept upright above by a cross piece or iron fillet. It is entirely without "ornamentation,"—to use the favourite word,—of any kind, except at the top, where it is hammered into a blunt point. A useful object, no doubt, but hardly a striking one. But if we go back in time, we shall find that this plain bit of iron work sprang out of a far more elaborate object, for every here and there in the older and "unimproved" parts of London are fragments of iron railings of quaint design, and even elaborately-designed scroll-work. Many will, of course, have noticed this, and will have perhaps been puzzled at the "extinguisher," which forms, with the ring for an oil lamp, so marked a feature in it. This extinguisher, by the bye, was for the purpose of putting out at night the torches or links which were carried by the servants who attended the "sedans" through the ill-lighted streets, and through some doubtless not lighted at all. This ironwork is at times—as may be yet seen in some fine old houses in Chelsea and other places—not a little elaborate, and cleverly designed. The iron gates may be cited in St. Paul's, both those that are yet visible, and those which have been

removed in the late alterations. It would be difficult to find finer specimens of elaborate and carefully-designed and well wrought ironwork. But this by the way, for our present object is to note what is *now* doing in the "railing" way.

The square and plain unornamented iron bar railing is certainly dying out, for in most new and improved localities there is to be seen substituted for it some ornamental patterned railing of cast metal quite in the spirit of the time, for it shows none of that hand-work for which the old ironwork of whatever date was so famous. We may almost ask, is it an improvement or a good sign? But the manner of the death of the good old plain matter-of-fact railing is in some cases not a little curious to note. Round Westminster Abbey, for example, this iron square bar was to be found in all its primitive simplicity, and it seemed to do its work of separating the little plot of green grass close to the venerable walls of the abbey from the adjoining churchyard full of grave-stones. But the spirit of improvement is now everywhere, and this plain ironwork has felt it with the other things round and about and in the old abbey. Small scrolls of wrought iron have been added to the upright square bars, and riveted into them and the cross-piece above, so that this railing may show how to ornament, before it is too late, a plain piece of construction. We allude to it because it was among the first of the old square bars which felt the magic touch of improvement. The iron gates in the archway leading into the cloisters, as plain as the aforesaid bars, were at the same time made not a little ornamental by the same process, and by the addition of some cast-iron details screwed on to the wrought-iron uprights. How far this is from the old way of work we need not hint at. It is modern imitative Gothic, but it shows what can be done with the square bar work in poor localities. We might go on to note some of the elaborate ironwork which is so fast displacing the square bar, as round the plots of grass and flowers in New Palace-yard, and the yet more ornamental ironwork enclosing New Palace-yard itself, and decorated with gilding in a lavish manner. Indeed, in and about the venerable abbey and the Palace of Westminster is a perfect paradise of ironwork, as far as we modern men can do such work. But it is to be feared that all this expensive work is a very long way, indeed, from the idea of the genuine wrought metal as it has come down to us from the past. Ironwork, even "iron railings," offer chances for the display of real artistic skill and taste, not only on *paper*, and as matter of design, but in the actual metal, the hard iron itself: not a mere series of repetitions of the same forms and details, as though cast in the same mould by a firm, but as offering opportunities for artist workmanship, not a little tempting and attractive! Are we really improving and progressing in artistic matters? Is it not better to leave the old square bar to do its useful work, and to remove it only when it can be supplanted by real art-work in iron, in small quantities may be, but still real, and true, and expressive, and *direct from the hand of an executive artist-workman?*

The public, it is true, have yet to be taught what is real and what is false in these things; but the public is right willing to learn, provided only that the teaching be practical, and eventually visible and tangible in result. It is the artist workman that is needed for these things.

Another remarkable difference between the old and the new fashioned system of treating railings is the practice nowadays growing up of colouring and gilding them. Dull iron-coloured oil paint seems to have satisfied the artistic longings of our fathers and grandfathers, but now simple iron colour, or dull green, for bronze, is not enough. The fashionable colour is a dull chocolate or reddish brown, with plenty of gilding. Iron, could it but be kept of its natural colour without rusting and destruction, would be all that could be desired. Nothing can be better in its way than the colour of good iron. It tells its own tale of hardness, and strength, and durability; but the rusting of it compels some sort of protective coating of varnish or paint, and it is an art misfortune, as we take it, that no substance sufficiently transparent has been found or invented that shall sufficiently protect the metal while preserving the colour of the iron, and yet allow of its natural surface being seen through it. Might not the finding out of such varnish, or other substance, be a good subject for a Society of Arts prize? It might, too, be not a little useful for other metals, as silver, liable to tarnish. Should not all natural material, as stone, wood, and metals, be allowed to show as such where possible,—*decoration* not hiding wholly the natural surface, but ornamenting it in parts?

It is, of course, useless to try to stop the course of building improvements, but it is unfortunate that there is no one to care a little for the things necessarily destroyed in the act of pulling down so much. Surely there ought to be some public official sufficiently qualified to look after these things, and to save a fragment here and there.

THE NEW OPERA HOUSE, PARIS.

For some time past the works of the new Opera-house,—that dream of the Haussmann era,—have been performed in isolated sections. There was a lack of funds and workmen sufficient to continue operations simultaneously in all parts of the building. Thus the greater portion of the proscenium was completed several months ago, as were the actors' and actresses' dressing-rooms, the *foyer des artistes* (save the medallions which are to contain the portraits of all the artists employed in the building of the Nouvel Opera), and the mosaics of the pillars and pavements, for the execution of which a troop of Italian workmen was expressly engaged. The contractor's staff is at present employed on the grand staircase leading to the auditorium. As it may be seen now, this part of the building, vividly illuminated from above, encumbered with scaffolding here and there, and peopled by a legion of workmen, offers one of the most picturesque spectacles imaginable. In one corner the sculptors are at work by the light,—even at noon,—of numerous gaslamps fixed on movable supports, and fed by india-rubber tubes. On the stairs, marble-cutters are polishing the balusters; others, by the aid of an ingenious contrivance, hollow out the marbles which are to be traversed by gas conduits: a tube of iron plate, to which a rapid rotary movement is communicated, penetrates the marble by the force of its own weight; and when the piercing is complete, instead of the *débris* left by other processes, a little column of marble is withdrawn from the block, cut and polished by the friction of the iron plate, which, according to the thickness of the marble, has made, in traversing it, from 60,000 to 80,000 revolutions. Above, the bronze-workers are constructing the balconies of the upper stories; lower down, the clever carpenter, Saintonge, and his gang, move heavy *madriers* without an accident, amidst the finest pieces of sculpture and delicate decorative work. Everywhere the noise of hammer and the screech of machinery add to the animation of the scene.

The works are sufficiently advanced to enable one to foresee the effect that will be produced by the grand staircase. The thirty columns of Larancolin marble, with capitals and bases in white marble of Saint-Béat, glitter already, and harmonise marvellously with the tints of the pilasters in violet *brèche*. The carving of the tympans of the arches, faces in bas-relief, executed by M. Chabaud, is quite finished. Little remains to be done to the details of the balustrades and vaults of the staircase. At the nine balconies of the first story, balusters in soft spar are being placed, surmounted by slabs of onyx. This is only one of the many finished portions which already give the building an air of Oriental richness. And yet much remains to be added. The enormous marble steps brought from the quarries of Gerravezza lie already cut in the cases, just as they arrived. The balustrades in antique red marble are yet in the municipal warehouses, awaiting the moment when they shall be placed on their basement of green Swedish marble, and surmounted with the onyx slabs. At the bottom of the staircase the marbles are being adjusted, on which will stand the two large groups of M. Carrier Belleuse, supporting candelabra. At the entrance of the *parterre* the architectural lines are interrupted at the space left for M. Jules Thomas's two caryatides, executed in variously-toned bronze, and draped with marble of different colours. Above every group of columns a space is reserved for the medallions of enamelled lava, whereon M. Solier executes, on a blue ground, designs of musical instruments of all times and countries.

Lastly, the ground is not yet quite levelled, nor sufficiently to receive its marble pavement; and on the ceiling four large cases alone indicate the spaces to be occupied by M. Pils's frescoes. The most hopeful among the architects will not vouch for the building being completed before eighteen months. The new Opera-house will then have been about ten years building.

NEW RAILWAY EXTENSIONS AND BUILDINGS.

STARTLING INTENTIONS.

An analysis of the proceedings at the recent half-yearly meetings of the several railway companies throughout the country, reveals the fact that on many of the leading lines new works and extensions on a scale of considerable magnitude, are about to be entered upon, involving an enormous outlay of capital.

Commencing with the London and North-Western Company, we find that the shareholders in this leviathan corporation, at the meeting on the 23rd ult., authorised the expenditure of 244,250*l.* in the enlargement of stations and the purchase of land. These extensions include 13,000*l.* for additional offices at the Euston station, 8,000*l.* for a new station at Old Ford, 9,000*l.* for new permanent goods offices at Broad-street, 16,000*l.* for the rebuilding and enlargement of the Nuneaton station, 7,600*l.* for additions to the works at Crewe, together with the sum of 58,364*l.* for additional accommodation at other stations along the company's lines. The estimated cost of the land alone for these new works is 115,559*l.* At the meeting of the company, the chairman made an interesting statement respecting the company's present rolling stock. He said that the number of locomotive engines, which in 1862 was only 1,000, had increased to 1,900 at the present time. The number of carriages which, in 1862, was 30,000, was now 40,000. The number of wagons had increased within the past ten years from 18,000 to 36,000; and the traffic receipts, which in 1862, amounted to 2,100,000*l.*, now amounted to 4,038,000*l.* During those ten years, they had converted wooden bridges into iron, at an outlay of 59,000*l.* It was now about five years since they had introduced the locking-up apparatus, and during that period they had carried out that alteration at a cost of about 500,000*l.* In addition to that, they had been introducing the block system, and it was now in operation to the extent of 489 miles of their line, while 381 other miles were fitted with the permissive block, which he believed to be the best system of the two. Thus very nearly 900 miles were on the block system, out of a total length of line of 1,600 miles.

The sanction of the shareholders at the meeting of the Great Northern Company was given to the expenditure of 185,365*l.* in new and enlarged stations and other works. These include 50,000*l.* for new offices and platforms, and also a new engine-shed and sidings at King's-cross; 45,000*l.* for a new goods depôt at Farringdon-street, on land which the company have leased from the Metropolitan Railway Company. This depôt includes the erection of large new goods warehouses near the junction of Charterhouse-street with Farringdon-street. The intended new works also include the construction of a duplicate tunnel at Maiden-lane, King's-cross, at an outlay of 50,000*l.*; also the enlargement of Lincoln station, at a cost of 4,000*l.*; the reconstruction of Ratcliffe Viaduct in iron and brick, instead of timber, 4,000*l.*; new signal-locking apparatus, offices, and water-cranes, at Grantham, 3,995*l.*; proportion of cost of new signal-box, locking apparatus, and additional sidings at Leeds; 6,200*l.* for proportion of paving York-road, King's-cross; together with upwards of 20,000*l.* for extensions at sundry stations on the railway. The report states that a considerable saving in the working of the London goods traffic will be effected by the erection of the new depôt at Farringdon-street, consequent on the great reduction in cartage; and with reference to the extensions at King's-cross, it states that the passenger-station there, erected twenty-three years ago, requires enlargement, daily experience proving that the existing accommodation is inadequate to the traffic, and also that the duplicate tunnel under the Regent's-canal has become indispensable. It may be added that, beyond the extensions at King's-cross above named, it is ultimately intended to carry out still more extensive and important enlargements, by the construction of a large central platform running the entire length of the station, together with the erection of a new frontage towards the Euston-road, in a line with the Midland Station and Hotel. These new buildings will contain an entirely new set of

offices, board-room, refreshment-rooms, waiting-rooms, and other apartments. In addition to the outlay above stated for new works, 144,162*l.* are about to be expended on new rolling-stock: viz., 21,600*l.* for new engines, 21,505*l.* for new carriages, and 101,057*l.* for new goods wagons.

At the Great Western meeting, the shareholders sanctioned the expenditure of 199,645*l.* for new works and stations, and purchase of land; also 40,225*l.* for the purchase of the Trewyddfa canal; and 80,000*l.* for new engines and carriages. The intended outlay for new works includes 103,849*l.* for an extension line and new station at Birkenhead; 16,270*l.* for a new station at Stourbridge; 9,400*l.* for engine sheds at Gloucester and Swindon; 10,000*l.* for a new goods station at Bristol; and 20,000*l.* for block telegraph for signalling and locking apparatus on the line generally. The new line between Bewdley and Kidderminster, authorised by the Act of 1861, the estimated cost of which is 60,000*l.*, is also at once to be proceeded with. The report also states that the permanent shaft of the Severn Tunnel railway was commenced at Portskewett in March last, and has been sunk to a depth of about 60 ft.

The Midland Company, however, almost eclipses all others in its past and prospective expenditure on works in progress and intended. The outlay which this great company is incurring in new works and buildings is something fabulous, as is proved by the remarks on this subject made by the chairman at the half-yearly meeting. He stated that the Midland Company had been laying out capital during the last few years to a very large extent. Indeed, he did not know that any company ever laid out capital at the same rate that the Midland had done during the last six years. He went on to show that within the period named the company's capital outlay had been between 2,000,000*l.* and 3,000,000*l.* sterling annually. In 1867 their outlay was 2,792,070*l.*; in 1868, 2,012,063*l.*; in 1869, 1,826,641*l.*; in 1870, 2,037,059*l.*; in 1871, 2,289,957*l.*; in 1872, 2,740,424*l.*; the total being an expenditure on works, in six years, of 13,698,814*l.* The capital expenditure during the six months ending June was 1,385,850*l.*, and the estimated expenditure for the current six months was 1,358,000*l.*, and 4,007,385*l.* in subsequent half-years, making 5,366,286*l.* more capital to be expended. Several of the new lines which have for some time been in progress of construction, are to be opened within the current six months. These include the Liverpool extension and new central station, which is advantageously situated in Ranelagh-street. Also that portion of the Mansfield lines known as the Worksop and Shireoaks line; the Radfield and Trowell; the Duffield and Selston; the Breedon and Ashby; the Ashby and Nuneaton; and the Stenson and Weston. On these several lines 1,052,000*l.* have been expended. On the Settle and Carlisle line, now in progress, 1,620,072*l.* have already been expended, and a still further very large outlay is necessary. The works are proceeding actively towards completion, but great difficulties have been encountered in getting labour and materials for the construction of the line. The company have made an engagement with the Forth Bridge Railway Company, for guaranteeing a certain amount of revenue to the company formed for constructing the great bridge over the river Forth a short distance east of Edinburgh. The amount of revenue guarantee in all is 75,000*l.*, of which the North British guarantee 60,000*l.* and the Midland 15,000*l.* per annum. The Midland directors regard the construction of this bridge as a most important improvement of the through route to the north and east of Scotland, in which they (the Midland Company) are very largely interested. Referring to the ultimate cost of the great St. Pancras Hotel, the chairman stated that the contract price for the hotel was 223,000*l.*, but that the completion of the building will cost between 30,000*l.* and 40,000*l.* more than the contract price in consequence of the advance of materials and labour. It will be twelve months before the building can be finally finished. It transpired at the meeting that the total capital of the company at present is 50,025,000*l.*

According to the proceedings at the meeting of the South-Western Company powers have been obtained for enlarging the company's works and stations at several points on the line. These include the improvement of the approaches to the Waterloo Station; the enlargement of the goods depôt and the locomotive establishment at Nine Elms; additions and extended station accommodation at Clapham Junction, at Basingstoke, and at Poole; and an extension of the Southampton Station. The works on the Barnstaple and Ilfracombe railway are approaching completion, and the line is expected to be ready for opening at the end of the year. New railways in the districts of Windsor, Ascot, and Aldershott, are also about to be commenced, as well as the extension of the Joint Portsmouth Railway to the water-side at Portsea, undertaken in conjunction with the London, Brighton, and South Coast Company.

The North-Eastern Company are about to expend the sum of 679,699*l.* during the next half-year in the erection of new warehouses, stations, cottages, sidings, and new lines in progress and about to be commenced. Of this sum 200,000*l.* are to be expended in new warehouses and stations at Newcastle, Leeds, Hull, Gateshead, Hartlepool, and Middlesbrough; 286,699*l.* for additional sidings, cottages, station accommodation, turn-tables, cranes, and other works; and 193,000*l.* in the construction of entirely new lines. In addition to these sums, the shareholders voted 468,263*l.* for stock actually ordered but not delivered, whilst the chairman stated that in subsequent half-years they would require to spend an additional sum of 2,136,302*l.*, making altogether for new works yet to be executed, 3,284,992*l.* The new lines in progress of construction, are the Helmsley and Pickering, the Knaresbro' and Boroughbridge, the Masham and Melmerby, the Leeds and Wetherby, and the Castle Eden and Stockton lines; also the extension works of the Hartlepool docks, and a large new station at York. The directors have also entered into an arrangement with the corporation of York for the construction of a new line of railway to the east side of the city, and it is intended to apply to Parliament in the next session for the necessary powers.

At the meeting of the Great Eastern Company, the chairman stated that the cost of the metropolitan extensions would not be less than 3,600,000*l.* net, but that if they exceeded it by 100,000*l.* he should consider the expenditure within the estimate. The cost of the Liverpool-street new station will be 250,000*l.*, but a temporary station is to be first erected, and the contractors are now under notice to proceed with the works at this temporary terminal station, which is expected to be completed and opened for the suburban traffic in October next. The permanent new station at Liverpool-street will take upwards of twelve months to build.

It was stated at the meeting of the London, Chatham, & Dover Company, that the new warehouses at Blackfriars are completed, and will be opened this month, along with the necessary connecting works and sidings for goods trains and wagons. Six lines of metals have been laid down on these sidings. The works in connexion with the new Holborn Viaduct Station have not progressed as quickly as was expected, and it is believed that that station will not be opened before November. The chairman stated at the meeting that under the award of Lord Cairns and the Marquis of Salisbury, they had sold surplus property to the amount of 450,000*l.*, and that they had still to sell property which was valued by Messrs. Vigers at 150,000*l.* With reference to the surplus land yet to be sold, the chairman observed that the sale of land of this description in London was a very difficult thing if they tried to get its full value. The increased price of labour and building materials had so completely revolutionised the building trade, that they had had a very anxious time with regard to this surplus property.

The proceedings at the meeting of the Lancashire & Yorkshire Company showed that during the past half-year a considerable quantity of land had been purchased for new and enlarged station purposes, the increasing traffic of the company demanding further accommodation. The meeting sanctioned the expenditure of 200,000*l.* for station extensions during the current half-year.

It was stated at the meeting of the North London Company that the widening works on the City Extension line between Haggerstone and Broad-street are now rapidly approaching completion, and will shortly be opened for traffic. The chairman, referring to the competition with tramways, against which the company had to contend in North London, said the company had good cause of complaint with regard to that competition. Tramways paid no Government duty, nor local taxes to any extent, and they even used the streets and roads to which that company contributed very largely in the shape of local rates. The tramways, without any restrictions whatever, were allowed to deprive the railway of a large portion of its traffic. Their competitors had not even to pay for the land they used, without having further privileges. The chairman added that the land required for the construction of their line had cost the company more than a third of its entire capital.

At the meeting of the London and Blackwall Company, the chairman stated that the two Bills in Parliament for improving the Stepney Station, the construction of a pier in connexion with the Millwall extension, the making of a short branch from Bow, and the using of steam vessels, having received the Royal assent, the works would be at once commenced.

It was stated at the meeting of the Metropolitan District Company that during the Parliamentary session they had succeeded in getting their Bill for an extension from West Brompton to Hammersmith, and that the construction of the line was now proceeding. It was also stated that the subject of completing the inner circle by extending the line from the Mansion House Station to Aldgate, would come before Parliament next session, and be promoted by an independent company. The Metropolitan Board of Works were anxious that something should be done in the matter, and it was expected that the scheme would be aided by a considerable contribution from the Board and the City.

The proceedings at the half-yearly meeting of the Furness Railway Company show that extensive works are in progress in new branches, and also at the dock works at Barrow, with which the railway company is connected. The Stank branch railway has been completed, and satisfactory progress has also been made with the foundations of the Bela Viaduct, the principal work on the Arnside branch. The main line is also being widened at various points, which will be completed this year. Very active progress has also been made with the Devonshire and Buccleuch Docks. The walls for the lock and ocean steamship berths in the Ramsden Dock and Basin have likewise been commenced, and the outer sea embankment for reclaiming the whole area of 250 acres is well advanced. Upwards of 240,000 cubic yards of material have been removed by dredging during the half-year, and additional anchorage for large vessels at Piel has been made. The sum of 500,000*l.* for the execution of these works is required.

THE REBUILDING OF ANTIOCH.

PROVIDING FOR EARTHQUAKES.

OUR readers will doubtless remember that, in the spring of last year, disastrous earthquakes occurred at Antioch, which devastated almost the whole of the town, and which certainly offered an opportunity, in the rebuilding of the place, for considerable improvement. We note, however, that the engineer-in-chief of the province of Aleppo (Mr. Haddan, an Englishman), has in vain displayed both science and energy in his efforts to introduce a mode of strengthening the houses and widening the streets of ill-fated Antioch, which may at any time have to undergo a repetition of its dangers. History, indeed, records several such calamities at Antioch, and they appear to have a periodical recurrence which ought to bring about the adoption of proper devices for the preservation of life. It is a significant fact, that many of the victims on the occasion of the last earthquake might have escaped if the walls of the houses had been built with lime or bound with wood, and if the streets had not been so narrow that the rows of falling buildings met as they crumbled down, to form one destructive heap over the crowds of people who were thus engulfed. Mr. Haddan has spared no exertion in pointing out these defects to the Governor-General of the province, and even devised a special mode of construction of the town on a new plan, with improved lines of internal communication. He proposed that skeleton houses should be erected with timber-battens, well-tied together with iron bands, on which overhanging roofs would rest. Stone walls cemented with lime were then to be run up around the wooden frames, in order to afford protection from sun or rain. A shock of earthquake, how formidable soever it might be, could thus do no more than throw the stone-walls outwards while none of the falling stones could injure those in the houses. The new plan of the town, by straightening and widening the labyrinth of tortuous lanes which previously existed,

would save the inhabitants from much of the danger after escaping from their houses; but we regret to say that these suggested innovations have been disregarded, and the town is beginning to rise again on its old foundations, built with mud instead of lime, and likely, as one writer states, to destroy its future population in even greater proportions than it did last year, for increased poverty makes the new houses weaker than even the old ones were.

NEW LIGHTHOUSE, BIRD ISLAND, CAPE TOWN.

THE Bird Islands are a group of small islets situated in Algoa Bay, about thirty-three miles E.S.E. of the town of Port Elizabeth, South Africa. Besides the three largest, which are called the Bird, Seal, and Stag Islands, there are a number of half-sunken rocks around these larger islands, extending about two miles in different directions. The group are about seven miles from the main land, the nearest point of which is Woody Cape. The farthest rock to seaward is the Dorington Rock, where the ill-fated *East Indiaman* was wrecked rather more than a century ago; the anchor and gun of which vessel is still to be seen lying between the rocks on Bird Island at low water. I have seen them many times. They must have been carried by the current from the spot where she struck to the place where they now lie: the distance is about a mile.

Bird Island is still the resort of thousands of sea-birds, principally penguins, and what they call here the malgass, but which is very much like the ganat, or sea-goose. These birds make their nests in the guano, and sit together in one large flock, covering the greater part of the island. Any one attempting to go among them stands a chance of having his legs torn and scratched, for while the female bird is sitting on her one egg, she is very vicious; she sits all the time, which is about five weeks, and her food is brought her by the male bird. When the young ones are old enough to fly, they are taken away by the old ones in large droves, and it is supposed that they go to sea, for they do not return to the island for about three months. The penguins are a curiosity to look at, with their little flappers, with which they are very active in the water. It is astonishing how fast they run. When they are pursued, they always make for the water; when once they are there they are safe. One would think at night that there were thousands of donkeys let loose upon the island, for the noise which these birds make is very much like the braying of that animal. The eggs of both these birds are eaten by the light keepers and those who visit the island; they are very wholesome, and not unpalatable.

There is a vegetable grown in the guano, and which covers a part of the island. It is very much like spinach, and it is eaten by those on the island. There is a large quantity of guano, which in some parts is as deep as 14 ft. There is an abundance of shells, but not a particle of sand or earth of any kind. There are a large number of seals, on one of the rocks, called the Black Rock: they are seldom disturbed, excepting by parties who go there sometimes for guano.

In 1851 the Cape Governor erected a wooden lighthouse upon Bird Island, for the benefit of vessels going in and out of Algoa Bay. It was a rather curious-shaped-looking building as seen from the sea. There were exhibited from the tower, in different positions, two fixed white lights. The tower was a pyramidal-shaped building, with a projecting landing or platform, upon which each of the lanterns was fixed. It had been noticed for some years past that this building was fast going to decay. It was built of wood, the framing part of which was connected with iron bolts; the iron seemed to be very much affected by the action of two salts, one arising from the water, and the other from the ammonia.

This building has been taken down, and close to where it stood a new and more substantial building has been erected. In 1871 the Colonial Government granted the money for this work. Drawings were at once prepared for the same, and the contract was signed in November of the same year, but the works upon the island did not actually commence until March, 1872; and the whole of the work would have been completed by the end of last year had it not been for the delay which took place in getting the lighting apparatus and other ironwork done in England. But it was so far finished by the 1st of May last, that the new light was exhibited for the first time on that day. It is a fixed red light, of the Third Dioptric order, the height of which is about 80 ft. above the level of the sea, seen about twelve miles off.

The buildings are now entirely finished, and the workmen have all left the island.

The whole of the work has been carried out according to the drawings. The tower is 60 ft. high from the level of the rock to the focal plane, or centre of light. It is a square building, quite perpendicular, showing on its north and south sides four circular apertures, which are connected with each other by a recess formed in the work, and a large moulding forming the whole into a cross, which is intended as a day mark; on the east and west side there is only one aperture.

The parapet is finished in the form of battlements, with small coved recesses under the cornices. The outside of the tower is coloured gray or light stone colour. The inside of the watch-room and cleaning-room is fitted with cupboards and other fittings to hold the different articles required for the establishment. The whole of the inside fittings are of teak and mahogany, and varnished.

All the lighting apparatus, as also the iron watchroom, lanterns, iron floors, girders, and stairs, were supplied by Messrs. Chance Bros., of Birmingham. Besides the tower, there are two cottages (which are connected on each side with the lighthouse) for the use of the light-keeper and his assistant.

The greater part of the buildings have been constructed with the stone found upon the island, and pointed outside and plastered inside. The arches are of brick and cement, which had to be taken to the island.

The roofs of the cottages are covered with slate, and provision has been made for preserving the water, which is a very scarce commodity at times. To each keeper's quarters an underground tank, holding about 2,000 gallons, has been constructed, and a 400-gallon iron tank has also been supplied to each house.

In connexion with the establishment a flagstaff and signal-house have been erected, so that the light-keeper can communicate with vessels passing.

The works have been carried out under the superintendence of Mr. Joseph Flack, of the Colonial Engineer Department.

The cost of the work is understood to be about 7,000*l*. Mr. B. Godfrey, of Cape Town, was the contractor for the whole of the work, excepting the part supplied by Messrs. Chance Bros.

ARMAGH ROMAN CATHOLIC CATHEDRAL.

THIS Gothic edifice, which crowns the crest of Armagh, has been dedicated. Its erection has extended over no fewer than thirty-three years, the foundation-stone having been laid in 1840. This delay is accounted for by the nature of the undertaking and local financial difficulties. The building has cost upwards of 60,000*l*., a sum which may be regarded as equivalent to 80,000*l*. considering the period over which it has extended, and the enormous increase of late in the price of labour and material. The original designs for the church were prepared by the late Mr. Duffy, of Newry, and were of the Perpendicular Gothic style. The work executed during his lifetime extended only as far as the top of the aisle walls and the arches between the nave and aisles. The erection of the building having been arrested for seven years, Mr. J. J. McCarthy, professor of architecture at the Roman Catholic University, was entrusted in 1854 with the completion of the cathedral. In the fourteen years which had elapsed between 1840 and 1854, a revolution had taken place in ecclesiastical architecture. Mr. McCarthy, therefore, modified very considerably the original design. The flat roofs, pinnacled buttresses of the clearstory, flat roofs of towers with angled pinnacles, and other features of the Perpendicular style, he discarded for the simpler and purer form of Decorated Gothic. He omitted the pinnacles of all the buttresses, substituting geometric and flowing for the stiff forms of Perpendicular tracery; introduced for the first time in modern Irish architecture the triforium; raised the roof from an almost imperceptible pitch to nearly an equilateral triangle; and, instead of towers rising to an altitude of 128 ft. from the ground-line, substituted towers rising to the height of 210 ft.

The plan of the cathedral, which is cruciform, comprises nave and chancel or choir, with aisles to both north and south transepts, and two western towers. The south transept is at present screened off as a provisional sacristy, but it is intended to erect suitable sacristies and a chapter-house at a future time. The dimensions within the walls are:—Total length, 210 ft.; width across nave and aisles, 72 ft.; across transepts, 112 ft.; and height from floor to ridge, 91 ft. The nave is separated from its aisles by three bays of similar shafts and arches. Over these arches are the triforia, consisting of marble shafts with moulded bases and carved capitals, with moulded tracery filling up the arches. Above the triforium rises the clearstory, containing in each bay three-light traceried windows. The principal entrance to the cathedral is by a moulded doorway in the west end of the nave, and also by similar doorways in the towers. Over the west door of the nave is a series of moulded and canopied niches, to be hereafter filled with statues of the saints. Rising above the niches is a seven-light traceried window, while the west gable terminates in a floriated cross. The towers rise in grades until they terminate in the bell stages, containing two double-light mullioned and traceried openings on each face. From these stages rise the spires, with tiers of lucarnes on alternate faces, each lucarne terminating with a gilt cross, till the entire is surmounted with beautifully wrought iron gilt crosses. Armagh was anciently the ecclesiastical metropolis of the island, and the aim of the builders of the cathedral has been to make it worthy of its historical position, which is rendered increasingly interesting by the tradition that on this spot, fourteen centuries since, Ireland's Apostle stood to defend the Christian religion.

LARGE MALT-HOUSES AT SHOBNALL-ROAD, BURTON-ON-TRENT.

MESSRS. T. LOWE & SON, and Mr. H. Mason, contractors, of this town, have been engaged for the past twelve months in the erection of one block of four malt-houses and engine-house, for Messrs. Bass, Ratclyffe, & Gretton, which are now near their completion. They were to have been completed in the beginning of this year, but owing to the excessive rains of last season, and the scarcity of building materials, it was impossible, as the buildings took 4,000,000 of bricks, about 7,000 cubic feet of timber, and 400 tons of ironwork.

The houses were commenced in the first week of June of last year, and will be quite ready for the malting season of this year. The buildings are from the design of Mr. W. Canning, the firm's engineer, and have been carried out under his superintendence. The dimensions of each of the buildings externally are 240 ft. by 90 ft. and 35 ft. high to the wall plate. The elevation presents no grand feature, but the buildings, though plain, are substantial. The materials used are common stock bricks, with a light sprinkling of Hollington stone dressings.

The external elevation is divided into bays of 8 ft. each, with a 3-ft. pilaster, which terminates with a stone impost, off which spring semicircular arches, the crown of which carries a line about 12 in. below a substantial brick cornice. The roof is divided into three spans, and covered with Bangor slates, 16 in. by 10 in. The gables have stone springers, which form a return for the brick cornice that runs up the gables. The gables are coped with Hollington stone.

The buildings have four floors, three of which are for the growing of barley. The dimensions of each are 126 ft. by 86 ft. 9 in., and 9 ft. 2 in. from floor to floor. Each floor is lighted by twenty-four sash windows. The cistern is at the west end of the ground-floor. Its dimensions are 81 ft. 6 in. by 9 ft. 5 in., and 3 ft. 4 in. deep, and it is capable of wetting 200 quarters of barley. It is constructed of brick in cement, with pressed brick lining; the channel is formed of white Minton tiles. Immediately over the cistern are two garners, provided for the screened barley to supply the cistern; their dimensions are 83 ft. 9 in. by 22 ft. 9 in.

The third floor is wholly devoted to the storing of barley; the dimensions of which are 149 ft. 3 in. by 86 ft. The floors are supported by iron columns, which stand 10 ft. 6 in. apart, carrying beams of Memel timber 14 in. by 7 in., and joists 7 in. by 3 in. Barley-garners and store-rooms have beams 14 in. by 9 in., and joists 11 in. by 3 in. The floors of each are laid with

1¼-in. grooved boarding, tongued with hoop-iron. The working-floors have 1¼-in. rough boards, over which are laid 9-in. red quarries, 2 in. thick, bedded and jointed with Portland cement.

At the south-east end of the working-floors is the kiln. It is provided for drying the grown barley. The kiln is of modern arrangement, and stands transverse with the main block of the building. The internal dimensions are 86 ft. by 50 ft. The roof is divided into two spans, and supported in the centre by octagon columns, which have intermediate flanges cast on for carrying the floors, which are constructed of cast iron, having girders which run longitudinally with the main building, 9 ft. apart, carrying iron joist, upon which Fern's kiln-tiles are used. The fire-grates are Albird's patent, of this town. At the south-east end of the kiln are store-rooms for receiving the malt from the kilns. The internal dimensions are 86 ft. by 35 ft. 10 in. There are three floors,—ground, first, and second. The ground-floors are used for storing tools, &c., for malting purposes; the first floor for storing malt; and the second for screening malt as it leaves the kiln. The floors are supported by iron columns, 7 in. in diameter, standing 10 ft. 6 in. apart, carrying beams 9 in. by 14 in.; flitched with ½-in. boiler-plates; joists 11 in. by 3 in., and boards 1¼ in., grooved and tongued with hoop iron.

The houses are divided by streets 30 ft. wide, but a gangway is provided from house to house in the top barley-stores by a bridge, formed of iron lattice-girders, lagged by 7-in. by 3-in. planks.

The engine-house stands at the south-west angle of the fourth house. Its internal dimensions are 37 ft. by 30 ft. The external elevation is the same as that of the malt-houses, but has a bold cornice of Derbyshire stone; it is covered by a large cast-iron water-tank, 41 ft. by 34 ft., and 4 ft. deep, for the supply of water to the malt-houses. The water is obtained from two large wells, 20 ft. in diameter, and 25 ft. deep. The water stands in the wells about 18 ft. deep. The engine-house is fitted up with four three-throw pumps, for pumping the water into the tank, and two 25-horse-power engines for the working of the houses. The engines are being supplied by the firm, but were built by Mr. Abell, of Derby, engineer, &c., who has supplied and fitted up the whole of the machinery and shafting of the houses. There is room in each house for storing 3,600 quarters of barley, and about the same quantity of malt. The estimate for the four houses and engine-house was 40,000*l.*, but this does not include the ironwork for the kiln floor, which is about 240 tons, nor the fitting for the houses. The houses promise to be when completed four as fine maltings as any in the kingdom. The total outlay will be about 50,000*l.*

It is the intention of the firm, next spring, to build four more houses on the south side of the engine-house, precisely the same as those already described.

The whole of the work has been done in a substantial manner. Mr. C. Garlick is clerk of the works. Messrs. T. Lowe & Sons are the contractors for the brickwork, earthwork, and masonry; Mr. H. Mason does the carpentry, joinery, and ironwork; and Mr. T. Turner is the plumber, glazier, and painter. Messrs. H. Edwards and Raynor are the foremen.

To make the work complete, Mr. G. Wooderwass, of Derby, builder, has entered into a contract for building twelve houses and six blocks of offices, and mess-rooms. The estimated cost is about 6,000*l.*, and will be completed about Christmas next.

NEW COUNTY POLICE COURT AND LOCK-UP FOR BLACKBURN.

A COMMODIOUS structure has just been erected in King-street, nearly opposite Montague-street, Blackburn, combining a magistrates' court, offices for the police, and cells for prisoners. The internal arrangements are not wholly finished, but the magistrates' court has been occupied. The style of the building is Venetian Gothic, freely treated, with red bricks and stone dressings to the doors, windows, string-courses, and cornices. Above the label-moulds to windows and doors, which are terminated by foliated bosses, are relieving blue Staffordshire arches. The front of the building is set back from the street, and inclosed by ornamental iron railings, gates, and moulded stone gate-posts.

The ground-floor is divided into two blocks of buildings by an entrance-passage, 10 ft. wide,—the walls being built of red bricks, with stone dressings to doors, having a varnished boarded ceiling,—with doors leading on the right-hand side to police waiting-rooms, 24 ft. by 16 ft.; store-room, 24 ft. by 7 ft. 6 in.; magistrates' and advocates' staircases, leading to court-room; and weights and measures office, 19 ft. by 16 ft. On the left hand of the entrance-passage is placed the charge-room, 18 ft. by 21 ft., having a bay-window to the King-street front. Adjoining this room is the office of the superintendent of police. Behind these last-named offices is a passage, 7 ft. 6 in. wide, leading to the cells, prisoners' exercise-yard, and staircase leading direct from the cells to the prisoners' waiting-rooms, adjoining the dock in court. A stone staircase, 7 ft. wide, leading to the court-room, for the use of the general public, is placed at the extreme east end of the building. Behind the prisoners' exercise-ground is a gig-house, loose-box, urinals, closets, &c.; and at the extreme end of the drill-ground, and facing Chapel-street, are two dwelling-houses for married constables. Above the offices and cells is the court-room, 48 ft. by 40 ft.; and adjoining are the magistrates', advocates', and witnesses' retiring-rooms, lavatory, closets, &c. The court-room is lighted by ten large windows, glazed with embossed plate-glass, having the arms of the county palatine in the centre of each window. Pilasters, supported on moulded stone corbels, divide the windows, and the ceiling is panelled and moulded in plaster. In the centre of each panel is a perforated medallion, for the purpose of ventilation. The benches and other fittings have the panels in varnished pitch pine, contrasting with the painted panel-work. The seats for the use of the public are open benches, having Macfarlane's bench-standards.

Ventilation is provided by grates in each window-bottom, and perforations in the ceiling. The court-room is lighted by gas-brackets fixed in each pilaster and by standards fixed on the dock and the attorneys' table. The whole of the offices and retiring-rooms are heated by open fireplaces. The court-room, cells, store-room, advocates' room, &c., are heated by hot water.

The whole of the works were let to Mr. Benjamin Abbott, builder, Blackburn, in June, 1872. The sub-contractors have been Mr. Peter Walsh, plumber and glazier; Mr. A. Airey, plasterer; Messrs. Embley & Pilkington, painters; and the whole of the hot-water apparatus, fire-grates, chimney-pieces, iron railings and gates have been supplied by Messrs. Mercer & Thompson, of Northgate. The floor of the magistrates' entrance has been laid with the tiles of Messrs. Malkin Edge, of Burslem, Staffordshire. The carving has been executed by Mr. Gregg, of Darwen. The whole of the work has been designed and carried out under the supervision of Mr. W. S. Varley, architect, Blackburn, at a cost of about 4,000*l.*

HEALTH AND COMFORT IN HOUSE-BUILDING.

SIR,—I have read in your pages Dr. Haywood's paper "On Health and Comfort in House-building," but I fail to observe how house-building for the million can be obtained, insuring either health or comfort, if such expensive plans for ventilation as he suggests must be adopted. The first and most vital question which the architect has to consider is,—"How can I build a house which shall prevent the occupier from being slowly poisoned from breathing an impure atmosphere." Your ranks are now filled with such educated scientific men,—is there no one of these who can lay down a cheap but really effectual plan for insuring the health and comfort of the people?

After all these years of discussion, and the full recognition by the public of the immense importance of thorough ventilation in all buildings, how is it that as yet there is no one who can carry into effect the aspirations of every thinking man? Dr. Haywood suggests it to be the duty of every medical man to imbue the minds of the public with the great importance of ventilation; to me it seems more desirable to imbue that of the architect. As an amateur, I have had for years experience in building. Fifteen years ago I built several houses; and, after some difficulty, my architect put in three of Sheringham's ventilators, which soon became useless; and now, being about to build a rather large house, my architect,—a gentleman of the very highest position in his profession,—has handed me his plans, which contain no plan whatever to render my house either "comfortable or healthy."

Dr. Haywood tells us "that we must have an inlet for fresh air, and an outlet to discharge the used-up atmosphere in *every room* in the house." The public are sufficiently educated upon the subject to give their universal assent to this proposition. To effect this object it appears to me that he, like all architects, is only catering for the occupation of houses by noblemen and wealthy proprietors. He says,—"The outlet must pass through some contrivance for keeping it constantly and permanently heated," night and day, winter and summer; and, "the inlet should open out of a warm lobby or corridor." Every room in the house is to have a shaft through the ceiling, and, to promote suction, these are to be constantly and permanently heated. How less pretentious houses are to be supplied with heat to keep the shaft in action in every room, and how corridors and halls and passages are to be built, and how the warm air to supply all the rooms is to be procured, he does not tell us. Before the doctor and architect again consult upon a plan for general and universal ventilation, I suggest that some of the "plebs" be taken into their confidence.

No one now denies the paramount importance of supplying every room with an abundance of uncontaminated air, and the general public expect that architects will settle the most effective plan at the least possible cost. If the large and lofty rooms of the rich require ventilation, how much more imperative has it become to afford some thoughts upon the overcrowded, suffocating rooms of the labouring classes, where sickly women and children are slowly but certainly starved to death from the want of an uncontaminated atmosphere. Practically there is no plan yet suggested for rendering house buildings "comfortable or healthy." If architects would pay a little more attention to the general defects of the internal construction of the building, and less of advertising themselves by an elaborate exterior, they might possibly succeed in furnishing such a plan as would be at once effective and of general application.

Some time since, I saw, I think in your paper, a simple plan for ventilating rooms. Place in the hall or passage a ventilator, near the ceiling, opposite to the fireplace; in the centre of the ceiling let the air pass out through a ventilator into a shaft running through each floor; or the foul air might find its way among the joists, and there deposit its carbon and other impurities. This plan is very simple, but is it practicable?

How am I to solve the question as to setting the grates, so as to throw as much heat into the room as possible, and at the same time avoid a smoky chimney? My architect gives the size of the openings, but leaves the construction possibly to some ignorant sub-contractor.

How far, then, should the fireplace project into the room? How soon should the open fire-space be contracted to the size of the chimney-flue; and what cubic space should be allowed to each chimney? Should the space be the same in all the flues, whether the opening be 4 ft. 6 in. or 2 ft. 3 in., or should all these details be left to the hazard of a man who takes the job, and who only seeks to make as much money out of it as possible?

If I happen to get an intelligent and careful mechanic, I shall owe no thanks to my architect if I get a "healthy and comfortable home" as a residence.

AN AMATEUR.*

HOW SHALL I BUILD?

IT is, perhaps, not a little remarkable that the question "How shall I build?" and an essay on the subject, should appear in the same issue of the *Builder*. Doubtless the paper of Dr. J. W. Hayward, of Liverpool, will be read with interest, especially by "An Amateur," who is about to erect for himself a residence. Indeed, the eighteen "points" have been often insisted upon in the pages of the architectural journals, and although it may not be novel reading for architects, it is at the same time highly refreshing to find the medical profession aiding in so desirable an object.

About three years ago the reports of a very interesting discussion on the ventilation of hos-

* In reply to a letter from this correspondent in a recent issue, three patentees or manufacturers, notably Messrs. Comyn Ching & Co., say he can have the information he desires if he will apply to them. This, however, is not the sort of reply the letter was intended to elicit.

pitals appeared in the *Builder*. Both medical and engineering, as well as the architectural professions, then unanimously agreed that ventilation by warmed air, washed, admitted along the skirtings, and having a sufficient exit near the ceiling, was the best possible scheme, and the most perfect system. It might be asked, with a fair prospect of an answer in the affirmative,—Is not the best system for hospitals the best system also for dwelling-houses, inasmuch as the manner of occupation is somewhat identical, and the convenience, comfort, and health of the occupants to be aimed at equally in each?

Dr. Hayward advocates a system of special ventilation at the ceiling, and the ceiling only; that is, the inlet of warmed air, and the exit of vitiated air to be in juxtaposition, or of necessity nearly so. There is, to my mind, not only a doubt as to its thorough efficacy, but it will for certain involve considerable expense by a vast and complicated system of pipes and perforated cornices, and which may possibly require considerable looking after and repair. The current of warm air, because it is warm, would have a tendency to escape, and to drive the vitiated air back on the heads of the occupants, so that there would be no direct unimpeded course for the vitiated air to take. When, moreover, the details of the system come to be worked out, I think it will be found that Dr. Hayward, like many other theorists, has described a system (far easier to do than to adopt it), but which even on paper appears too complicated, involved, and uncertain, to recommend itself to ordinary house proprietors for general adoption.

The arrangement I propose would be simple, permanent, and cheap. The walls are to be built hollow, to prevent the percolation of damp, and along the hollow space passes a hot-air pipe. They are thus rendered less subject to changes of atmosphere by the current of warm air continually passing up the cavity from the hot-air pipe. The warm air, therefore, not only keeps the walls dry, it also keeps them warm, and is admitted into the room at dado height. The pure air is admitted through one or more gratings, either from the exterior or from the cellar, and passes over the hot-air or water pipe. It may be contrived for the air to pass a considerable distance along the course of the pipe before it enters the room, which should be at no great distance from the floor. Passing upward through the room, which is its natural course, it again finds its way into the hollow of the wall, whence it escapes to the upper regions by flues arranged for that purpose. These flues should, like smoke-flues, be carried high into the air, because the air at considerable altitudes is lighter and colder than that near the ground, so that the greater the height the greater the suction of warm or vitiated air, and the more thorough the ventilation, and less subject to back draughts. This plan is equally applicable to all the floors of the house, and that, too, without any or but trifling additional expense. It is easily controlled by the inlets at the bottom of the wall, or by the inlets into the rooms, which would be similar to the sliding ventilators of railway carriages. The author does not claim originality for such a system; it at once suggested itself when arranging for the heating apparatus and pipes for a conservatory to be built along with the dwelling-house, so that by an extra expense of about 35*l.* in pipes and sliding ventilators, a house of considerable size will, I trust, be both warmed and ventilated, without additional continuous expense, a system as permanent as the building, almost self-acting, and so simple as to commend itself to ordinary intelligences for adoption.

J. HICKS.

THE following suggestions are for the use of "Amateur." I have given each system practical test, and can in confidence place them before his notice:—

For ventilating near the centre of basement of building, have a bricked walled room 10 ft. by 6 ft., with a plate-iron door. In this fix a coil of high-pressure pipes, 8 ft. by 4 ft., heated. One of J. L. Bacon & Co.'s would be very suitable. From the centre of this coil run a tunnel of 8-in. earthenware pipes to outside of building, taking great care to have the mouth away from all drains or other objectionable matter. Over the external mouth fit a fine-mesh perforated zinc cover, and in any convenient part place an iron throttle-valve—an inexpensive one, formed of plate iron. Have all joints made good in Portland.

Over the coil fix a sheet-iron hood, with 4½-in. flange all round, to be bedded in side and end walls; three or four courses of brickwork to run on the flange. From the centre of crown of hood run a diagonal sheet-iron tube, 1 ft. 10½ in. by 4½ in., up one of the ascending walls, branching from this to each room with same shaped pipe, 6 in. by 2 in., between joist or behind skirting to under the window; the end of pipes to be T-shaped, parallel with the wall. The skirting to be iron trellis, or, if required, a dado of same. A simple valve introduced would be useful as a check to heat. Have all joints branching from main rising pipes made Y-shaped. By this means you will have a pure warm air in winter, and cold without draught in summer.

For egress have a perforated centre in ceilings, or gratings in wall or cornice, from which carry a tube, as for ingress, to rising tube same size. Let the end of this egress-tube pass through your hot-water circulating cistern, which have fixed in roof. I take it for granted that you will not have a 20-roomed house without hot-water for bath, &c. Let the tube be large in cistern, and from the top take a pipe, with cowl on top of all, into outer air.

For stoves, let "Amateur" have register stoves, with a well-fitted register on top, and on line of fire-bars, or bottom, have a 3-in. opening. This opening to go direct into a 4½-in. by 4½-in. flue running up the back of coves; on top, or nearly so, fit a small damper to each side of stove. In ash-pit under flues, fit a small cleaning door. By these means you will have no down-draught, nor any soot blown over your furniture, save half your coal, and gain twice the heat as from a common register. The top damper to be kept shut; only used for cleaning.

BONEL A. EVANS.

SCIENTIFIC INSTRUCTION.

THE Third Report upon Scientific Instruction and Advancement of Science, in connexion with the two Universities of Oxford and Cambridge, has been issued by the Royal Commissioners appointed to inquire into this subject. The report takes a hopeful view of the future. In dealing with the relations of the universities with science, the Commissioners say that their use of the word was limited to the "Sciences of Organic and Inorganic Nature, including under that general designation the sciences of number and magnitude, together with those which depend on observation and experiment; but excluding the mental and moral sciences, as well as all those parts of human knowledge and culture which are not usually regarded as having any scientific character." They state their opinion that neither the literary nor the scientific branch of education and research can be neglected without detriment to the other. The following are the subjects referred to in the evidence:—1. The Courses of Study and the Examinations; 2. The Professoriate; 3. The Scientific Institutions within the Universities; 4. The Colleges; 5. The Relation of the Universities to Technical Education, and to Education for Scientific Professions; 6. The Duty of Universities and the Colleges with regard to the Advancement of Science.

Proposed Examination on Leaving School.—The Commissioners are favourable to an examination, at Oxford or Cambridge, on leaving school, as open to fewer objections than a matriculation examination on entering the university.

The Scientific Curriculum: Proposed Arrangements.—When Mr. Mark Pattesou was asked if he would allow a young man without literary training to enter himself on the scientific side in the University of Oxford, he replied that he would have the University take no cognisance of the matter if he chose to enter as a scientific student. Professor J. C. Adams, of Cambridge, thinks literary culture extremely important, as without it the mind is apt to become narrowed, especially if it be devoted exclusively to material objects, and that, in consequence, even physical studies themselves are likely to be pursued with less success.

University Scholarships in Natural Science.—It is proposed to found these scholarships at both Universities. The Commissioners suggest three every year,—one in physics, one in chemistry, and one in biology. The natural science tripos has not proved so attractive as the mathematical tripos. The establishment of University scholarships would foster its growth.

Technical Education.—With regard to technical education, the difficulty of making either Oxford or Cambridge into a great school of medicine is very considerable; these places are both comparatively small, and their hospitals, therefore, inadequate for large medical schools. The absence of manufactories raises equal obstacles to the study of civil engineering. Preliminary scientific training, however, both in medicine and civil engineering, may be given at the Universities. A professorship of civil engineering is a desideratum, the Commissioners think.

General Advancement of Science.—On no point are the witnesses examined by the Commissioners more united than they are in the expression of feeling that it is a primary duty of the Universities to assist in the advancement of learning and science.

GREEN LANES WESLEYAN CHAPEL, HIGHBURY NEW PARK.

FOUR architects were invited to submit designs in competition for this chapel. The selected one emanates from the offices of Messrs. Satchell & Edwards, under whose superintendence the chapel is in course of erection.

The building is planned to accommodate 1,000 persons, viz., 700 on the ground floor and 300 in the galleries. Two vestries and a lavatory are provided in the rear. The interior consists of a nave and side aisles, divided by an arcade of five arches executed in Bath stone, resting on columns with richly-foliated caps, which carry the clearstory walls. In the rear of the pulpit and reading-desk is the communion-table, in an apsidal recess which is railed off with ornamental iron standards surmounted by an oak rail. The seats are 20 in. wide, with book-shelves and hat-rails. Umbrella-stands will be affixed at the ends of the pews. A most spacious vestibule is provided in connexion with the principal entrance, the walls of which are 4 ft. 6 in. deep, acting as a covered porch, into which a liberal amount of carving will be introduced. This vestibule, while leading into the nave and aisles, will also communicate with the side entrances which serve the galleries. The sub-story, standing 8 ft. out of the ground, is 14 ft. in height, and contains a schoolroom (acting also as a lecture-hall) for 300 children, an infants'-room for 100, four large class-rooms, distinct and commodious lavatories, and a chapel-keeper's residence.

The building, from the ground floor to the collar of its roof, at which point it is boarded in, represents a height of 56 ft., the height from the basement to the ridge being 80 ft. The tower rises to a height of 150 ft., the side-towers acting as staircases being 75 ft. high.

The internal fittings will be of deal, stained and varnished. The windows will be filled in with leaded lights, having rolled cathedral glass of varied hues. The building will be lighted by means of suspended star burners and brackets under galleries, and will be heated on the warm-air system by Messrs. Haden & Sons. Ample provision is made for ventilation by means of chambers in the roof and tower. The whole of the exterior will be faced with Kentish rag stone, Box-ground stone being employed in the entrances, windows, dressings, quoin-stones, &c., and red Mansfield in the shafts of columns. The boundary-walls will be similarly treated, surmounted with ornamental ironwork and gates.

The contract has been taken by Mr. Chessum, of Shoreditch, at 6,100*l.*

ASSESSMENT OF RATES ON GOVERNMENT PROPERTY.

THE parochial authorities of Chelsea and Woolwich, being parishes burdened with barracks, are again at issue with Government with respect to the insufficient contribution paid towards the parochial rates. The local Board of Health at Woolwich have been informed that an appeal which they made for an increase of the contribution paid by the Government in lieu of rates, on the ground that new properties have recently been acquired by the Crown, and that nothing is paid towards the highways and drainage, is under consideration. The half-yearly payment of the War Office towards the relief of the poor of Woolwich is 2,500*l.*, but if the Government property were rated in the same proportion as that of tradesmen, the amount would reach ten thousand pounds a year. In Chelsea, the rating of the barracks and hospital is much less, and the parish are threatened with a cavalry barracks as soon as Knightsbridge Barracks are evacuated or tumble down.

ARCHÆOLOGICAL SOCIETIES.

The Bedfordshire Society.—The locality chosen this year for the annual excursion was St. Alban's. We glean from the full reports in the local *Times*. The excursion party upon their arrival from Bedford proceeded to St. Peter's Church, where they were met by the rector, the Rev. H. Dudding, and one of the churchwardens, who kindly pointed out the most prominent features of the building. The company next drove out of the town northward in order to take a cursory view of Barnard's Heath with its earthworks, reputed to have been the scene of the Yorkists' defeat under the Earl of Warwick at the hands of Margaret of Anjou in 1461, in what is commonly called "the second battle of St. Alban's." Upon their return they alighted at the Clock Tower, said to have been built between 1402 and 1427: possibly it may have been erected at first to bring the curfew bell near to the centre of the town. Sir Gilbert Scott considers it to have been the old tower belfry, similar to those in the cities of Belgium, and remarks, "the whole is a very curious structure and unique in this country." The party enjoyed the great advantage of being accompanied in their inspection by Mr. Lloyd Ridgway, local honorary secretary of the Hertfordshire Archæological Society, and Mr. Chapple, the clerk of the works. Under their guidance nothing was wanting to make the three hours spent within this wonderful pile enjoyable and instructive which could be supplied by an intimate acquaintance with its history and structural features, and an enthusiastic admiration of its grandeur as a whole and of its marvellous details. We may mention in passing a remarkable discovery made in examining the foundations of the piers supporting the enormous tower: one of them had been hollowed out to a considerable distance and the cavity roughly filled up with wood, apparently with a view to the destruction of the tower by setting fire to the wood and so removing one of its supports. Happily by some means the object was defeated; but this discovery leads to the suspicion that many of those majestic buildings of which we now know nothing except from history or tradition or from the silent witnesses afforded by their ruins were thus undermined and laid low. Reluctantly turning from this enduring memorial to the pious munificence of its respective builders, the company, after partaking of luncheon at the Pea-hen Hotel, made their way to St. Michael's Church, on the south-west side of the town, within the boundaries of the city of Verulam, from which the materials of its earlier remaining portions were derived. Those who had previously visited St. Michael's, the object of greatest interest, after the Abbey Church, traced with satisfaction the judicious hand of Sir Gilbert Scott in its improved condition. The Rev. B. Hutchinson, vicar, was present, and obligingly described the work of restoration which has been carried out. Apart from its antiquity, this church is well known as the resting-place of Lord Bacon, Baron of Verulam, and Viscount of St. Alban's. His alabaster statue fills a recess in the north wall of the chancel: he is represented in his Chancellor's robes, reclining in an elbow-chair. Within sight of these ruined walls the party next turned their steps towards the third of Abbot Wulsin's foundations, the church of St. Stephen, on the Roman road of Watling-street, where the Rev. P. U. Brown favoured them with particulars. The return-path to St. Alban's afforded a distant view of the ruins of Sopwell Nunnery. Camden and Stukeley record the tradition that Henry VIII. was here married to Anna Boleyn. Sir Richard Lee, who became possessed of this house, repaired and enlarged it with the materials of the dissolved Monastery. It fell into decay in the reign of Charles II. In a field near the town, between these ruins and the abbey, is the ancient well from which the nunnery obtained its name, protected by an arch of brickwork, and indicated by a tree planted beside it. Thus concluded an excursion which will long be remembered with interest and satisfaction.

The Sussex Society.—The annual meeting was held at Winchelsea, being the second visit of the Society to that place; the previous one having been in the year 1854. On arriving at Winchelsea Station, the members proceeded at once to the town. The first place visited was the Priory, which is in the grounds of The Friars, belonging to Major Stileman. The only part of the Priory which remains is the chancel of the chapel. Major Stileman gave particulars as to the Priory. The party next proceeded to the church, where an interesting history of the building and of the town was given by the Rev. E. Whitehead (the vicar). They then proceeded to inspect the church and the churchyard, and afterwards the old gates of the town. The dinner was served in the Town-hall,—originally the Water Bailiff's Prison,—where the chair was taken by Mr. G. B. Gregory, M.P.

Somersetshire Archæological and Natural History Society.—The twenty-fifth annual meeting of the members of this society was held at Wells on Tuesday in last week. After a short address, Mr. W. A. Sandford, the president, vacated the chair in favour of the new president, the Bishop of Bath and Wells, who delivered an inaugural address; after which the company repaired to the chapter-house, where Mr. J. T. Irvine read a paper on the architecture of the cathedral, and after service he conducted the members round the building, pointing out its peculiar features and practically illustrating his paper by showing the relative ages of the different portions of the structure. In the evening there was another meeting at the town-hall, when several papers were read. In connexion with the meeting a museum was formed at the town-hall. The *conversazione* on Tuesday was well attended, and some interesting communications were made. The Rev. Prebendary Scarth read a paper descriptive of an inscribed stone which was found within the Roman station at Sea-mills. He combated the idea of a Fellow of the Society of Antiquaries, that the stone was Mithraic, contending that it was a Christian tombstone. In this view he was supported by Mr. Parker, and the Rev. Prebendary Earle gave it as his opinion that the word "Spes" engraved on the stone was a religious sentiment, and not a name, as had been suggested. On Wednesday, the first excursion of the meeting was made into the country, the places visited being Compton Martin, West and East Harptree, and Chewton Mendip. The excursion party was a very numerous one. The greater part of the drive was accomplished in a pouring rain. After dinner at Wells there was another meeting at the town-hall, when Dr. Beddoe, of Clifton, read a paper on "The Ethnology of Somersetshire." Then followed a brief discussion and a paper by Mr. B. Ferrey, diocesan architect, on the sculptures in the west front of the cathedral, and other minor communications. On Thursday, the concluding day of the meeting, the first place visited was the old church of St. Cuthbert, upon the history of which Mr. T. Serel read a short account, while Mr. Freeman described its architectural features. A very old canon's barn and a Mediæval house, which has been restored by Mr. Parker, were next inspected, and the majority of the party then took carriages for Wookey-hole, while others bent their steps towards Wookey church, lately restored. On their return to Wells they went to the palace, in going over which Mr. Parker acted as *cicerone*. This work accomplished, the party, numbering upwards of a hundred ladies and gentlemen, by invitation of the Bishop and Lady Arthur Hervey, had luncheon in the crypt of the palace.

BRANSGORE CHURCH.

THE district church of St. Mary, Bransgore, near Christchurch, Hants, has lately been reopened after undergoing the addition of a chancel with a semi-octagonal apse, together with reseating the nave, the benches being open and of stained deal. The main material of the walls is red brick, with Box-ground Bath stone dressings, the roof being covered with Bangor slates. It has been found difficult to deal satisfactorily with a church, the body of which is utterly at variance with present notions of architectural propriety, but the addition of a chancel has somewhat made an improvement. A stone arch carried on corbels now separates the nave from the chancel. The chancel has a panelled and ribbed semi-circular ceiling of stained deal. The lectern and altar-table are of pitch pine, and from the architect's design. The chancel-seats with prayer-desk are also of the same wood, with moulded and shaped ends and an arcaded book-front. The paving is of encaustic tiles. The pulpit is of Box-ground stone, with square ornamental panels. The organ is placed on the south side of the chancel, in a recess contrived for that purpose. The total cost has been about 1,000*l*. Mr. J. Lander, of Burton, near Christchurch, was the builder; and Mr. Ferrey, F.S.A., the architect. The warming is managed by one of Porritt's stoves.

SANITARY QUERIES.

Is it not true that the old cesspool system in cities is being exploded, and main drainage and sewerage systems are adopted, and that the results are shown everywhere in improved health and a decreased rate of mortality?

Is it not true that the contents of cesspools have been from time immemorial used on farms, market gardens, and for many agricultural and horticultural purposes?

Is it not true that modern sewage, which is a more diluted article than the former, has been used for similar purposes with a similar beneficial effect to the soil and the products of the soil?

Is it not true that mankind in these kingdoms subsist mostly on what comes from the soil and through the soil, and that what comes from the soil once more goes to the soil?

Is it not true that the earth is the great universal and purifying filter through which all putrefaction passes, our own bodies included, and that it only fails to perform its offices when man fails to do his duty by it?

Is it not true that the earth is a perennial farm and fountain of all healthy life and living, from the blade of grass and the ear of corn to the seam of coal and the crystal spring?

Is it not true that men stumble at a gnat and swallow a camel when they are actuated by other than lofty motives for the common weal, and that interested considerations are the ruin of society?

Is it not true that there is a proverb which says, "Conceit is as good for a fool as physic," and are there not cats and dogs who eat grass as well as geese and swans, the former as a medicine and the latter for food?

Is it not true that the world has long since heard that "What is one man's meat is another man's poison," and are we not aware that where the bee extracts honey the man extracts inebriating liquor or poison?

Is it not true that butter that is scalded when making gets rancid in a few days, and that hot water is often added in private and public dairies to hasten the churning?

Is it not true that the colour of butter is guided much by public taste, and that white and yellow quality, when not produced in the churning, is produced afterwards by the adding of other ingredients?

Is it not true that hundreds of milch cows are kept tied up in London dairy-yards from one year's end to the other, and that a mere partition often separates the cow-shed and undrained yard from the dairy?

Is it not true that at some metropolitan dairy-yards pigs, poultry, and dung-heaps, consumptive pumps and sunken vats for the drain of the sheds and other outhouses are to be found within a circuit of a few yards?

Is it not true that there is a most unhealthy combination of matters scarcely dreamt of by the noisy opponents of sewage farms and sewage grass?

Is it not true that ventilation and temperature are most important considerations in the management of dairies, and that, notwithstanding this knowledge, the milk in our dairies is often left to take care of itself?

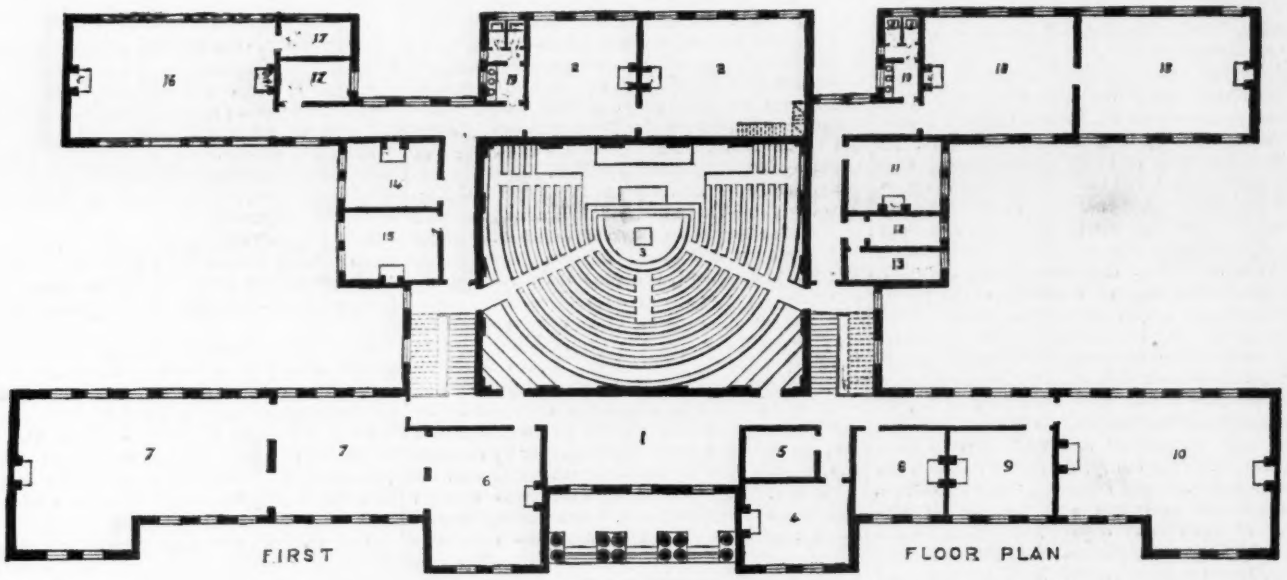
Is it not true that a large number of milch cows have been fed on sewage grass and sewage farm produce for the last few years in many places, with the best results, and that wherever complaints have been made they have been disproved, on inquiry, as groundless?

Is it not true that sewage is sewage and that grass is grass, and that there is about as much difference between the component parts of the one and the other as between the cow and the cauliflower, that may be found on the same pasture and utilised alike for the food of man?

Is it not true that dirt and uncleanliness in air and aliments are the chief causes of epidemics, and that in the prevention of these causes will be found the cure and the personal and public safety?

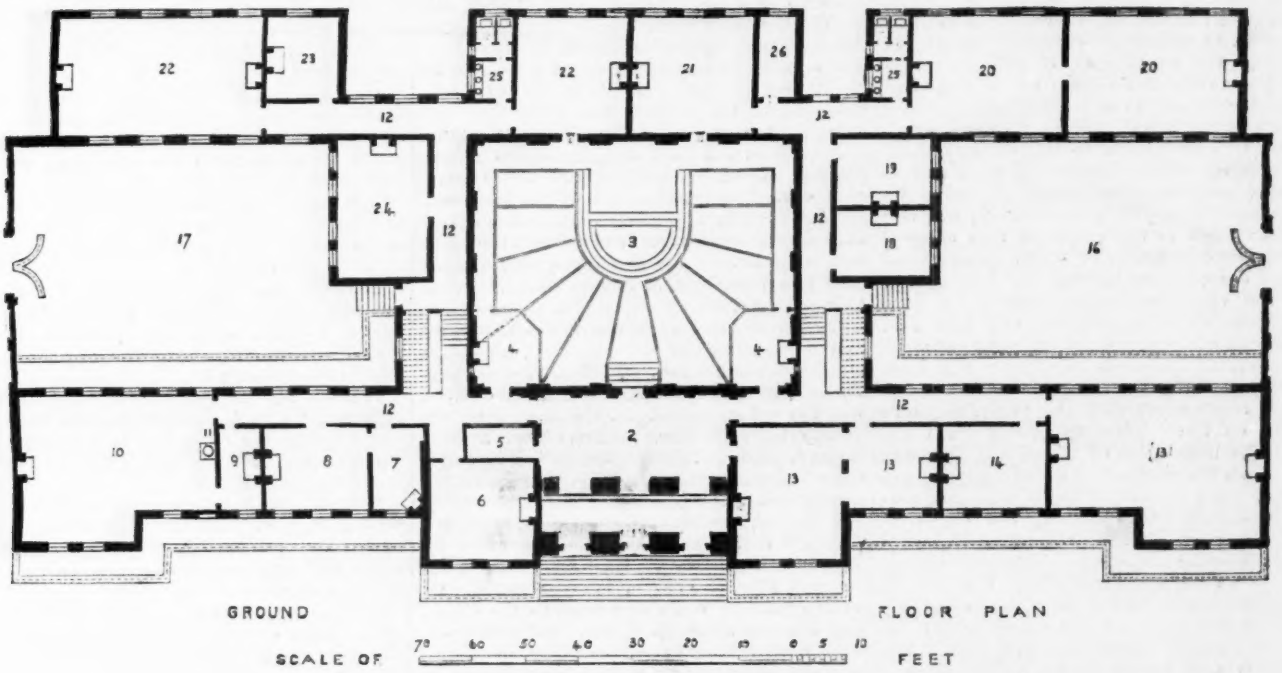
THE ROYAL ENGINEERS' INSTITUTE, CHATHAM.

THE School of Military Engineering at Chatham, was originally established to provide for the professional and technical education of the officers and men of the Royal Engineers. During the last few years, however, the rapidly increasing demands for the services of both officers and non-commissioned officers of Royal Engineers in India, as well as the necessity for meeting



REFERENCES TO FIRST-FLOOR PLAN.

1. Gallery.
2. Photography.
3. Lecture Theatre.
4. Draughtsmen.
5. Messenger.
6. Museum for Inventions.
7. Museum.
8. Testing-room.
9. Construction Instructor.
10. Construction: Officers' Hall of Study.
11. Survey Instructor.
12. Survey: Instructor's Store.
13. Survey Messenger.
14. Instructor.
15. Assistant Instructor.
16. Glass-house.
17. Dark-room.
18. Survey: Officers' Hall of Study.
19. Lavatory, &c.



REFERENCES TO GROUND-FLOOR PLAN.

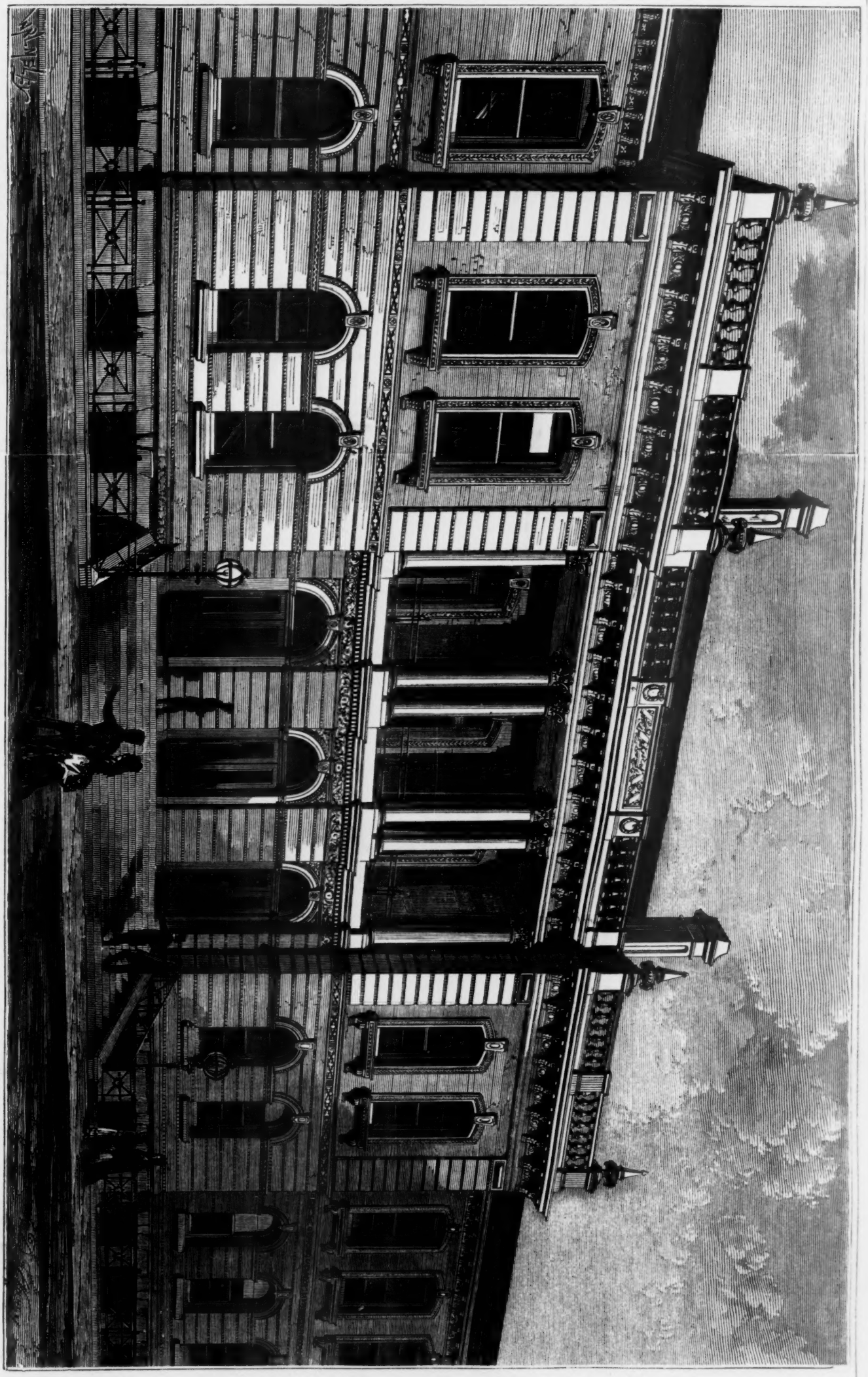
1. Vestibule.
2. Hall.
3. Lecture Theatre.
4. Retiring-room.
5. Messenger.
6. R. E. Committee.
7. Secretary.
8. Clerks.
9. Librarian.
10. Library.
11. Gurney stove.
12. Corridor.
13. Construction: Model-rooms.
14. Construction: Assistant Instructor.
15. Construction: Men's Hall of Study.
16. South Court, Construction: Survey and Signalling.
17. North Court: Telegraphy and Photography.
18. Survey: Assistant Instructor.
19. Signalling: Assistant Instructor.
20. Survey: Men's Hall of Study.
21. Signalling.
22. Telegraphy.
23. Instructor.
24. Drawing-room.
25. Lavatory, &c.
26. Store.

THE ROYAL ENGINEER INSTITUTE, CHATHAM.

the call for higher scientific education for all branches of the army, have led to considerable extension in the area of its operation, and to a great increase in the numbers of those who yearly pass through its courses. The accommodation of the instructional departments has been added to from time to time to meet, as far as possible, their increased requirements, but it has long been found both inconvenient and insufficient. In order, therefore, to concentrate in one building the various educational branches, and to provide for their accommodation on a scale better suited to their wants, a sum of money was, in accordance with the recommendations of the Royal Commission on military education of the previous year, voted in 1871 for the erection of a Royal Engineer Institute, and the building, of which plans and a part elevation are given, was designed at the War Office by Lieut. Ommanney, R.E., under the direction of Sir Frederick Chapman, R.E., K.C.B., inspector-general of fortifications and director of works. It is Italian in style, the details of the main front being somewhat freely treated in order to give scope for the employment of terra-cotta instead of stone in the whole of the ornamental work except the upper members of the cornices, and the columns over the entrance, as will be seen from the plans. The Institute consists of a front and rear range connected by a central block, so that the buildings enclose between them two courts, upon which open the various class-rooms allotted to the instruction in telegraphy, surveying, construction, army signalling, photography, &c. The schools for printing and the chemical laboratory, are in the half basement of the front, the ground and first floors of which are occupied by a museum, libraries, committee-rooms, and offices. In the central block is a theatre capable of seating 400, and intended for the delivery of lectures on subjects connected with military science.

The building is executed in brickwork, with terra-cotta cornices, window dressings, string courses, &c. The front up to the first floor is faced with white Suffolk bricks, with a horizontal course of terra-cotta dentil bricks at every fifth course; above the first floor the face work is of yellow malms, giving a good contrast with the terra-cotta. General Scott's Selenitic mortar, supplied by the Selenitic Mortar Company, has been used throughout: the proportion of four sand to one lime for face work enables a good clean joint to be struck, while six to one for all other parts makes very strong and good work.

The contractor for the erection of the building is Mr. Sollitt, of Strood; the terra-cotta work being supplied by Messrs. Doulton & Co., of Lambeth. The cost of the building is 21,000*l*.



THE ROYAL ENGINEER INSTITUTE, CHATHAM.—DESIGNED BY LIEUT. OMMANNEY, R.E., UNDER DIRECTION OF SIR FREDERICK CHAPMAN, R.E., K.C.B.

A GLASS CAMEO VASE.

MR. JOHN NORTHWOOD, of Wordsley, near Stourbridge, has completed, after nearly ten years' labour, a vase which will doubtless be talked about. According to the Birmingham *Daily Gazette*, it resembles in its general character the Portland and Pompeiian vases. It is a two-handled or Amphora vase, decorated with Greek ornament. Around the body is a broad band of cameo ornament, consisting of two well-selected equestrian groups from the frieze of the Parthenon, more generally known as the Elgin marbles. The vase is made of pure flint glass, and, therefore, is much more brittle and difficult to work upon than ancient glass. "The groups in relief are finely deadened, raised against a more densely deadened ground. Each portion is delicately and perfectly finished, the action of the horses, the accurately delineated figures of the riders, whose features must be examined under a magnifying glass to be fully appreciated, the nostrils and the hoofs of the horses, and the various trappings, all alike display the marvellous skill and patience of the artist." The breaking off accidentally of a small piece would have spoiled the whole work, the loss of a horse's hoof, a man's hand, or any similar accident, would have been irreparable, and it is in the fact that the vase is completed, and completed perfectly that value is given to the work.

THE PRESENT AND FUTURE OF THE COAL TRADE.

THE inquiring mind might find a good deal of food for reflection, if he chose to turn his attention to the question of the future of the coal trade, a subject on which it must be owned a good deal of speculation has already taken place. This subject seems just now to be more than ever complicated, inasmuch as the returns of the quantity forwarded to London during the month of July, showed that even in the midst of summer the demands from the metropolis were greater than they were in either December or January, or, in other words, the tonnage sent was larger than at the period named. At the present time the demand on the collieries in both Yorkshire and Derbyshire is fully as large as it was last month; seeing then that stocks of coals to the extent known in past years are not to be found on the pit banks for winter supplies, it becomes a question of more than ordinary interest as to how the coming winter will find the coal consumer. It is, however, pretty generally admitted that the public are laying in stocks in the hopes of preventing being imposed upon as they were but a short time ago; and there are those to be met with who hold that coal will be as good if not better to buy at Christmas than they are at the present time. In pursuing such an important theme as the future of our coal field, it may not be uninteresting to glance at the progress which is being made in the various parts of Yorkshire and Derbyshire, from which a large proportion of railway-borne coal finds its way to the metropolis. Throughout the Derbyshire district several new collieries are being opened out, which when properly at work will add to the output to a large extent. In the county of Leicester borings are, it is said, about to be made, with a view of proving the measurers. Around the ancient town of Wakefield, and more particularly in the districts of Walton, Crigglestone, Harbury, and Ossett, a good deal of coal is being raised, for the most part from thin beds near the surface, which a few years ago were counted as worthless. It is, however, from the South Yorkshire district that relief is to be obtained in time to come, if such a thing is possible. Within an area of six or eight miles of Barnsley, four or five very large collieries are now either in the course of being sunk, or preparations are coming on to that end. In each case the seam of coal to be worked is the Silkstone bed, which is known to be one of the richest seams that can be won. The distance between the Barnsley seam and the Silkstone may be said to be from 370 to 390 yards. In several places in the district, large coalfields have been leased by important and well-known firms and companies, and in several instances sinkings have commenced to the Barnsley seams. At the present time the Barrow Hematite Iron Company are sinking to the Silkstone seam. At Worsbro', Messrs. Newton, Chambers, & Co., of the Thorncliffe Iron Works, are going down to the same bed, near Hoyland Common. A new company is going down with two very large shafts at Darfield, on the Midland Railway. Near to Barugh, the same well-known seam is about to be sunk to on the estate of Mr. J. S. Stanhope, of Cannon Hall. Several new shafts on a very large scale are also being put down to the Barnsley bed, within a few miles from the town of Barnsley. Doubtless one of the most interesting problems connected with this rapid extension of coal mining, and one which will require solution, is that of meeting with labour in the present state of the market. To many the only visible relief is to be found in the development of coal-cutting machinery, which has not made so much progress as it ought to have done, and which those who have devoted their time, talents, and money to accomplish had a right to expect.

THE CENTRAL RAIL RAILWAY.

WE have no sooner concluded that human invention has attained its limit in this, or that, special direction, than all at once we are startled by some announcement which shows that what we supposed to be its ultimate form was only a stage in development. Who would have thought till a few months since, notwithstanding the "pannier" railway proposed last year, that trains would ever run upon other than two rails? And now such a project is before the world, which, its promoters assert, will probably revolutionise the present system. In this project, which we noted in our issue of the 23rd ult., the inventor utilises the principle by which the bicycle rider travels balanced and steady above two narrow wheels. In the proposed single line of rail system the carriages and engine will have a single row of central and double-flanged wheels striding or saddling the single central rail.

The recollection of mishaps and upsets to bicyle riders in starting will probably excite the reader's smile as soon as the project is proposed to him. But the inventor does not intend that his engines and carriages shall struggle into steadiness like the bicycle rider: he provides balance-rails and wheels. The balance-rails are provided for some distance in and out of stations. The carriages and engines will be brought very much nearer the ground, and many other sources of danger in our present railway system will be mitigated,—at least so says the inventor, who proposes lighter trains and engines, and that trains shall run more frequently. Existing lines would be able to accommodate three or four "ways" of the new style within the compass of the usual "up" and "down" lines.

The inventor suggests several forms in which, under different circumstances, the system may be worked.

OPENING OF A JEWISH SYNAGOGUE IN MIDDLESBROUGH.

ON a site in Brentnall-street, the foundation-stone of a Synagogue has been laid in Middlesbrough with fitting ceremony. The site runs between Brentnall and Baxter streets, 100 ft. by 44 ft., and will contain in the basement a large kitchen for the "reader" (who it is intended shall reside on the premises), bath-room with "Miva" or dip, pantry, closets, and other conveniences, and is approached by a flight of stone steps through two arched doorways flanked with brick piers and stone capitals, with an entrance-hall 12 ft. square, laid with Webb's encaustic tiles to a pattern, out of which are the entrances to the committee-rooms, staircase to gallery, synagogue proper, and reader's sitting-room. The committee-room is 15 ft. by 12 ft., and will also be used as a ladies' cloak-room. The synagogue proper will be 32 ft. square, and is laid out with the intention of including an additional 32 ft. as soon as the room is required. It will be seated for 132 male adults. On the ground floor the seatings throughout will be of pine, and the seats will have solid ends, panelled fronts, and book-boards. The whole of the interior woodwork will be stained and varnished.

The Almemar (or reader's desk) will be lighted by eight small standards, and a star or sun light will be suspended from the centre. Twelve gas brackets will be fixed under the galleries. The synagogue is lighted with six semicircular-headed windows on the ground and fourteen on the gallery floor. The first floor is approached by a flight of steps, with turned banisters and rail to architect's design, and is lighted by oriel windows with margin lights. This story will be 12 ft. in height, will contain a large roomy landing, and a schoolroom 28 ft. by 12 ft. This room is lighted with two double windows, with a front aspect, and one facing the yard. It is estimated to hold upwards of fifty scholars, according to the regulations of the Educational Board. The gallery of the synagogue is approached from the landing on this floor. The gallery is supported on five cast-iron columns, and is seated for 120 female adults. The seats will be similar to the ground floor. The gallery front is panelled and finished with top-rail. The ceiling of the synygogue will be a feature in its construction. A plaster cornice will be run round above the windows, springing from which will be a coved ceiling, formed into squares, with panelled beams, the centre having an elaborate centre flower. At each of the beams a plaster cap is inserted, and a plaster enrichment is run round at the springing of the arches of the windows. The panelled beams have ventilators inserted of perforated zinc. The front of the building will be set back 5 ft. from the street line. At the outer edge of this area there will be a dwarf wall, with stone coping, and an ornamental iron railing. The height of the synagogue, from the pavement to the eaves will be 31 ft., and from the eaves to the ridge will be 11 ft. The materials used in the construction will be brick and stone, the front facing to be of red pressed bricks, with Forcett stone facings. The design is Classic in character. The windows are double, having flat heads with stone column between them, and carved capitals. The synagogue is ventilated with Archimedian screw ventilators. The contract has been let to Mr. Joseph Lord, of Middlesbrough, who is to complete the work by January, 1874, for 1,650*l.*, from the designs prepared by Mr. E. Tidman, architect, Middlesbrough. The amount already raised by public subscriptions exceeds 1,000*l.*

DOOM OF THE CITY CHURCHES.

AMONGST other old churches in the City of London marked out for destruction are St. Martin Outwich, near the Bank, in Thread-needle-street; St. Antholm, Watling-street; and All Hallows, Bread-street. In the last edifice our great John Milton was baptised, and the register kept in the church there proves it:—"The 20th day of December, 1608, was baptised John, the sonne of John Milton, scrivener." The font is still in the church. Milton was born in the same street.

A visit round last Sunday showed most of the City churches to be free of worshippers, except St. Mary Woolnooth, Lombard-street, of which the late vicar of Holy Trinity, Brompton, the Rev. W. J. Irons, D.D., is the rector. We are disposed to believe that our City churches would not be so empty at service hours but for the quality of the ministration.

IRON IN SUSSEX.

SIR,—In reference to a recent notice of the above subject in your paper, it has been generally supposed that the railing around St. Paul's Cathedral was cast in two different localities on the borders of Sussex, viz., some at or near Lamberhurst, in East Sussex, upon the borders of Kent, and some at Chiddingfold, near Haslemere, in Surrey, but on the borders of West Sussex.

Having resided some time in this locality, I have reason to think there were several small ironworks in the neighbourhood, as Burnfold and Chiddingfold; whether these folds designated ironworks or not I cannot say, but some persons think they did, as there are Lichfold, Dunsfold, and Aldfold. Even at the present time there is evidence of the country roads having been repaired with furnace slag. Of course, the iron ore of the Sussex district was smelted with oak charcoal. There are some ponds near Hindhead, upon the Portsmouth and London turnpike road, called Hammer Ponds to this day; and it is probable there was a tilt hammer or hammers worked by a water-wheel at each of these ponds, and they have retained the name ever since.

I have had the iron ores of these localities examined: they contain about 25 per cent. of iron upon an average, some of the samples are a little richer, and some a very great deal poorer. The Cleveland iron ores contain about 28·57 per cent. of iron, and they are obtainable in vast quantities, and not far from the Durham coal-pits. Yet they bring hematite iron ore from Bilboa, Spain, to mix with the Cleveland iron ore, and I guess at ten or twelve times the cost per ton of Cleveland ore; and also peroxide iron

ore from Northamptonshire, and probably from other localities. Therefore, unless the Sussex iron ore possess special qualities there is little probability of its being used, as its carriage to iron-making districts for admixture would be too expensive; were it near the sea perhaps it might answer to ship it to the north, but, I look upon it, the carriage would be too great for the idea to be entertained. HENRY TURNER.

P.S.—I think your correspondent must labour under some misconception about iron deposits near Brighton. I know of no iron deposits except on the north side of the county: still there may be some; but all around Brighton is of the chalk formation.

RE-OPENING OF ROLLESTON HALL, DERBYSHIRE.

FESTIVITIES have recently taken place at Rolleston Hall, in celebration of the restoration of the old hall, and in honour of the marriage of Mr. Mosley.

The dining-room and morning-room are restored, and the new works already finished consist of a billiard-room, 36 ft. long by 21 ft. wide, and communicating by glass doors with a conservatory, 60 ft. long and 40 ft. wide. There are also mahogany doors, with plate-glass upper panels in the conservatory, leading to the main passages and an adjacent saloon, about 50 ft. long, over 30 ft. wide, and about 25 ft. in height, and fitted with oak floor, and gallery or orchestra. This saloon has a roof, with a lantern light, from the sides of which it is wholly lighted, and can be ventilated, supported on ornamental iron principal ribs, with scrolls at the bearings leading down to the caps of pilaster on the walls. The exposed woodwork of the roof is covered with parqueterie by Messrs. Howard & Sons, London. The decoration of the walls is not complete, but we hear that marble will be introduced. Near to this saloon is the private entrance to a suite of rooms on the ground floor, with cellars below, fitted with Farrow & Jackson's iron bins. On the other side of the saloon are gentlemen visitors' offices, baths, &c.; also general offices for men-servants, and their working rooms. The kitchen, which has been entirely remodelled, is fitted up in a complete manner with roasting-range, ovens, hot plates, steaming apparatus, hot table and closet, smoke-jack, &c. (furnished by the Derwent Foundry Company, Derby), gas stoves, ventilators, &c. The entrance, or west wing, is still in course of construction. The external face has a large carriage porch, supported by Ionic columns and pilasters in the centre, with balustrade parapet, and the superstructure is of Italian architecture. The plan contains large entrance-hall, or vestibule, in character to suit the front, separated from the inner hall by opaque glass and mahogany screen with folding doors. The floor is to be laid with squares of marble to pattern. The inner hall will contain a rich oak staircase, now being prepared by Messrs. Slater, of Derby. Starting from the centre, and rising to the first landing (about 11 ft. in width), it continues on each side to the upper landing. At the stair-foot and landings are six large bronze figures (supplied by Messrs. Haywood, of Derby, and made expressly for the purpose), each supporting a cluster of gas-lights. The hall has a large lantern light at the top, and a coved ceiling beneath the whole. The walls will contain a large number of family portraits and pictures, forming a gallery. On either side on the upper floor are large chambers. On the north side of the principal entrance is the library, nearly 40 ft. long and 22 ft. wide. On the south side besides a smaller room, is the drawing-room, about the same size. The chandeliers in the conservatory and all the principal rooms are Benham & Co.'s patent, which secure perfect ventilation, and are supplied with fresh air from the external walls. These have been put up under the superintendence of Mr. Church, district manager. The passages, staircase, and rooms generally are warmed by hot water, and lighted with gas, for which purpose new works have been erected just outside the park. The south front is 250 ft. in length; the west, 115 ft.; while the whole of the buildings, &c., occupy just one acre of land. Along the south front of the hall a terrace has been formed, with broad gravel walk, having on either side vases filled with flowers, and mounted on stone bases. The gardens, lawns, and grounds generally, as well as the glass houses, which are very extensive, and the produce large, are all in order. All the gas works and fittings, hot water supply, and plumber's work have been executed by Mr. T. Crump, of Derby. Mr. Upton has done the bricklayer's work; Mr. Forbes a portion of the joiner's work; while the joiners on the estate, with their foreman (Mr. Rushton) are completing the remainder. The painting and decorations have also been executed by the men on the estate, with Mr. Rushton (brother of the foreman) as head of the staff. Messrs. Clarke, of Burton, have executed the mason works, and Messrs. Bird & Dyer, of Ashby-de-la Zouch, the plastering. The whole of the works throughout have been designed and carried out under the direction of Messrs. Giles & Brookhouse, of Derby, architects.

FOREIGN LOANS AND VENTURES.

THE writer thinks this a fitting opportunity to direct attention to the enormous losses that have been sustained by this country under this head; he moreover trusts that Government may initiate plans for the employment of surplus capital and savings in the reclamation of waste lands, the embanking of rivers and coasts, and works of public utility, in place of investments in the sinking funds of Foreign Loans, at present as rife as ever.

Some time back he was induced by a relative to invest nearly 2,000*l.* in American State Stock Securities; he received two dividends, and the principal is now hopelessly gone, although the faith of the Sovereign State was inviolably pledged.

Previously to another exodus of British capital, let holders of money reflect whether an investment in this country may not be more secure, at all events more tangible. CAVE.

HERNE BAY.

THE preservation and reclamation of the coast line between Herne Bay and the Reculvers is becoming a serious question. The inroads made by the sea, and the want of land drains, are making ravages that can only be met by the erection of a proper "sea embankment wall," and the trimming of the slopes of the ground: in many cases these reach an elevation of 80 ft. to 150 ft.; and a carriage-road might be formed in connexion with the sea-wall, of say 50 ft. in width.

Some remarks in your columns, some time back, have apparently been attended with good results. May we hope that the attention of the proper authorities,—*query*, who are they?—will be directed to the "preservation and reclamation" of the coast line of England.

CAVENDO TUTUS.

BOARD SCHOOLS.

Croydon.—The Bynes-road Schools, the first set of schools erected by the Croydon School Board, have been publicly opened. The total number of children belonging to the Board's schools is 999. The group of buildings, which are of yellow stock bricks, relieved by Bath-stone dressings and red bands, have been erected by Mr. Hyde, under the superintendence of Mr. J. Berney, architect. They consist of two residences, one for the head-master; and the schools, which are divided into four sections,—a senior boys', a senior girls', a junior mixed, and an infants' school,—are designed to accommodate 544 children, of which nearly 200 are already on the books. A spacious playground is attached to each school, and a covered shed has been provided for wet weather. The rooms are fitted up with the necessary school appliances, and the arrangements for lighting, heating, ventilation, and drainage are of approved modern character.

Liverpool.—The first of the School Board's temporary schools has been opened. It is situated in Love-lane. The construction of the building, which was designed by Messrs. Reade & Goodison, architects, is peculiar. It is almost entirely composed of American spruce, and is capable of being removed from one site to another, whenever occasion may require, without damage. In fact, with the exception of the slating, the whole may be taken down and re-erected without driving or drawing a nail. The whole is constructed in sections of 10 ft. long, so that the schools can be lengthened or shortened at will. The original structure has, indeed, been already divided into two parts, one of which is already finished, in Love-lane, and is intended to accommodate 400 pupils. The other is placed in Mill-street, and will hold 300. The contract price for the work was 1,145*l.*, and it was undertaken by Messrs. Jones & Son, of Liverpool.

SLIGHTLY DEFECTIVE RAILS.

SIR,—*Apropos* of the shocking waste of life by railway accidents at this moment, I have just read in one of our most largely circulated Northern newspapers the subjoined advertisement, which, under the most unfeigned hope that it may be capable of some other and possibly more technical interpretation than that which I am compelled to put upon it, I leave to the meditation of your readers who are in the slightest degree interested in the vital questions arising from railway accidents:—

"RAILS.—For sale, 2,000 tons of perfect and new, *slightly defective*, of various sections and weights, from 30 lb. to 80 lb. per yard.—Address," &c.

VIGILANS.

THE TRADES MOVEMENT.

MESSRS. JACKSON & SHAW, builders and contractors, of Earl-street, Westminster, were summoned to the Westminster Police Court, by Reuben Lee, one of their stonemasons, for 2*s.* 4½*d.* due to him as wages. Mr. Morten, barrister, appeared for the complainant, and Mr. Braid, chief foreman, represented the firm. It appeared from the opening statement of the counsel and the evidence of Lee, that the complainant had been in the service of the defendants for eighteen months. When he first went the wages were 8*d.* per hour, but afterwards were raised to 8½*d.* In July of this year a deputation of the men employed at the new Midland Hotel waited on Messrs. Jackson & Shaw for an increase of wages to 9*d.* Messrs. Jackson & Shaw said they would be guided by the decision of the masters' meeting, and that decision was that from and after the first Saturday in August the pay should be at the rate of 9*d.* per hour. On the 9th of August some of the men were paid 9*d.*, but the complainant, without any cause being assigned, only 8½*d.*: hence the summons. These facts having been proved, Mr. Braid admitted that the resolution passed by the masters had been acquiesced in by Messrs. Jackson & Shaw, who were paying the best hands 9*d.*, but the complainant was only worth 8½*d.*, and as such was paid: other men in the yard were paid from 6*d.* upwards. Mr. Morten said the man had drawn first-class pay for eighteen months. Mr. Braid said, after the dispute was settled the complainant left the job at the Midland Hotel, and got under a new foreman in the yard. Mr. Arnold said, if the firm had not intended to pay the complainant 9*d.*, they should have had a contract to that effect. Mr. Braid said that was impossible. This was a very important case, and would govern hundreds of others, and the case was that of the Society of Masons, not of the man Lee. Mr. Arnold agreed that it was a very important case, and it was very hard that the master or any one should pay for work not done; still, the firm had agreed to pay the advance, and had shown no excuse for not doing so. The case was extremely clear, and he wished one of the firm had been present to explain the circumstance. The defendants would have to pay the 2*s.* 4½*d.*, and 2*l.* 2*s.* costs.

WATER FOR LONDON.

THE water examiner, Mr. Frank Bolton, in his last report, says that the Kent Company are giving constant supply of water to about 1,000 houses in their district, situated in the parishes of St. Mary, Rotherhithe, and St. Paul and St. Nicholas, Deptford.

The New River Company have now the power of affording effective constant service in their district. They have also commenced a new high-service covered reservoir to contain 1,000,000 gallons at Southgate, in anticipation of the requirements of the water supply to Edmonton parish.

The East London Company, in accordance with their notice previously given to a special district of 6,328 houses, turned on the constant supply on the 25th of March. The district was altogether unprepared for the constant supply, and the Company has had to overcome the tardiness of the small landlords by cutting off the water supply of nearly 500 houses in this block,

and the owners of such houses have thereby been compelled to amend the fittings. The district is under rapid improvement, and the tenants are gradually deriving the benefit of the constant supply.

The Southwark and Vauxhall Company are constructing covered service reservoirs at Nunhead, to contain 18,000,000 gallons, and are erecting additional engine power for high pressure constant supply. Additional boilers and works are also being constructed at Hampton.

The West Middlesex Company are giving constant supply to a number of houses on the application of the owners, who have provided fittings according to the Board of Trade regulations of the 10th of August, 1872, and are fully prepared to extend the constant supply when called upon. This Company is also constructing additional engine power at Hammersmith and at Hampton to ensure effective constant supply.

The Grand Junction Company have completed a high service reservoir near Kilburn, to contain 6,000,000 gallons for constant supply, and are now laying a line of main pipes to connect up this reservoir with the works at Campden-hill, and are likewise erecting additional boilers and works at Hampton.

The Lambeth Company are carrying out extensions and improvements in their works. At Molesey, the construction of reservoirs is being proceeded with to contain 110,000,000 to 120,000,000 gallons of water, with pumping engines to fill them to a level of 12 ft. above the river.

If the following clause of the Board of Trade Regulations, 1872, relative to waste-pipes is carried out in its integrity, it will prevent contamination of the water from the gases generated by sewage, which are extremely liable to flow back into the cisterns and become absorbed by the water.

Regulation 14. "No overflow or waste pipe other than a 'warning-pipe' shall be attached to any cistern supplied with water by the company, and every such overflow or waste pipe existing at the time when these regulations come into operation shall be removed, or, at the option of the consumer, shall be converted into an efficient 'warning-pipe,' within two calendar months next after the company shall have given to the occupier of, or left at the premises in which such cistern is situate, a notice in writing requiring such alteration to be made."

The particular object of the above is to prevent any waste of water, but it will also effect an object of far greater importance by getting rid of the poisonous effluvia and gases from the drains which would otherwise ascend through the pipe, and not only be partly absorbed by the water in the cistern, but be partly mixed with the air in the houses, thereby becoming a cause of fever and disease.

NORTH SURREY DISTRICT SCHOOLS, ANERLEY.

THESE schools, which last year suffered much from ophthalmia amongst the children, are about undergoing considerable alterations, with a view to stamping out the disease and providing against its spread in future. The existing buildings are to be thoroughly cleansed and disinfected, and means taken to secure more perfect ventilation.

A new swimming-bath will be constructed, in addition to ordinary baths, and the washing of the children will take place under jets of water constantly running, basins being entirely abolished. New play-sheds for boys and girls, school and class-rooms for infants, workshops, and extended playgrounds are also to be provided.

The works are being carried out, at the suggestion of the Local Government Board, at a cost of over 10,000*l*. Mr. A. G. Hennell is the architect.

THE CHILDREN'S HOME.

THE Lancashire branch of the above institution, at Edgeworth, near Bolton, was formally inaugurated on Saturday last, the 30th of August, when a memorial pillar was placed in its position in a conspicuous corner of the grounds by the Rev. W. M. Punshon, LL.D., in the presence of a large concourse of people. On the same occasion the corner-stone of a new house for girls was laid by the Rev. Charles Garrett, Wesleyan minister, of Liverpool.

The third house now being erected will be a detached building, and is intended to be a house for a family of girls, who will be trained in laundry work, and will have suitable outbuildings erected, and drying-grounds, &c., attached, for carrying on that work. This house, with outbuildings, will cost upwards of 1,000*l*., contributed or collected by the children of the Wesleyan ministers in England and Ireland, and will be known as "The Ministers' Children's Gift-house."

Additional farm-buildings have also been erected, and a house for a farm bailiff is in course of erection, in addition to those already named. The whole of the buildings are of a plain but substantial character, being erected principally of stone got from a quarry on the estate. The works have been carried out by local contractors, under the direction of Mr. Thomas Ormrod, architect.

A NATIONAL SCHOOL OF ART.

SIR,—A national school of art, as England is at present constituted, is a moral impossibility. No country in Europe,—in the world,—has at the present moment more schools and machinery for art-instruction than England; but England is too sectarian, too divided in its foundations of thought, for that at-one-ment of opinion and purpose essential to develop a national art, a school, in the same sense that the Grecian and Italian schools were national schools of art. We begin by grafting instead of growing, and "marry a scion of a nobler stock to bark of baser kind," and the consequence is that we get neither the native crab nor the splendid old fruit, but a hybrid, which advanced taste pronounces unsatisfactory.

If, however, we would only be patient, and grow art from the very seed and root, and out of some future unification of opinion and purpose we should, in the course of time, have a national school of art in its very truest sense. My axiom, and I have intently studied this subject, is that in order to obtain a school of art such as desired, we must first look to the national school for intellect, and see that our system of general education is right. If this is right, depend upon it art will take care of itself.

W. CAVE THOMAS.

COVENT GARDEN.

PLACE of wondrous recollections,
Noble deeds and imperfections,
Haunts and homes where art and fancy,
Letter'd ease and necromancy,
Lived and moved, and had its being,
When old London loved the seeing.
Hallow'd ground of facts and fables,
Antique crypts and crowfoot gables,
Churches, schools, and halls of lecture,
And dead and living architecture;
Works begot of men's high culture
Still outliving their sepulture.
Shorn of flowers our hearts would harden,—
Bless thee for them, Covent Garden!

"A NUT FOR CHICHESTER."

SIR,—I opened my *Builder* this morning in the hope of finding some reply to your correspondent "Gargoyle"; but none having appeared, permit me a few words. To begin:—He is not very happy in his *nom de plume*, for it is clear that either he has never visited the city he has undertaken to lecture on matters sanitary and architectural, or, as his name would imply, he has viewed it from so lofty a position that his sketch fails to be recognised by those who really know it. He tells us that "it stands on a gravelly flat, and that the houses are built of the largest (*sic*) boulders from this gravel." Now, sir, Chichester is built almost entirely of brick, chiefly red, and notably has two or three houses of that material, of fine elevation (said to have been built by Sir Christopher Wren), nor can I at this moment remember any built of the "largest boulders." East-street, as he admits, is a noble one. Unfortunately, as in many other towns, a large number of our old houses have been covered with that modern abomination cement; and although its architecture cannot be said to be of a very high order, yet there are few more picturesque cities. Its four streets, of unusual width, meet at the exceedingly beautiful market cross, which has recently undergone considerable improvement. The unsightly iron railing so long enclosing it has been removed; the stone steps and paving are restored, the former giving it a well-defined base line; and it is hoped that reviving taste will ere long decree the removal of the white clock dials and other disfigurements which now so mar its beauty. I will pass over his remarks on the council-chamber, with its "lively lion," but the rooms in it are not without grace, or are finely proportioned. The chief charge against us, however, is that we are a dirty city. Now, sir, I am no defender of dirt,—and here permit me to acknowledge how much we are all indebted to the *Builder* for the sanitary lessons so long and ably taught,—lessons, I trust, not altogether lost on us,—but this charge is contrary to fact; and let me say that the "stranger passing through" will not be offended either in sight or smell. We have an unusual amount of open space in proportion to our area; indeed we have been called a "city of gardens"; and in old coaching-days I have heard it said that we were celebrated for pretty faces, clean pavements, and windows. We have certainly no modern system of deep drainage; but this question, in connexion with other sanitary matters, has been much debated, and it is doubtful whether, in the present not very encouraging state of things exhibited in other cities, our governing body would have shown much wisdom in adopting extensive drainage works. Let it not be supposed, however, that we are quite so lethargic as represented. Mr. T. Hawksley, one of our most eminent engineers, has been the adviser of the council, and we have removed from the streets our large cattle-market; and, under his superintendence, constructed, at a cost of 15,000*l*., one of the finest and best-arranged markets in England. He states, in his report on the sanitary condition of Chichester, "his decided conviction that it has been unjustifiably charged with being an unhealthy and uncleanly city." A Bill has just been passed for the construction of waterworks; and the recent reports of our sanitary officer, a medical man of high standing and experience, are singularly favourable, showing an absence of those diseases of a zymotic type which so surely follow a neglect of the laws of health, and a death-rate of 14 in the return of last quarter is one that few cities can boast.

The Lavant stream, as its name implies, is intermittent, and some time since a survey was commenced by a competent engineer, with a view to its improvement; but until very recently a full volume of water has been flowing, rendering any works impossible. I feel confident, however, that our governing body will not neglect this important matter. As to our social shortcomings, the artizan class, or as he pleases to call them, the "great unwashed," are neither worse paid nor are they worse conducted than in other towns, nor is "property valueless." We fully recognise our great want, that of new houses and villa residences; and house-agents will tell you that inquiries for them are frequent; but to build houses we must have land; and, sir, if you will walk round our city, you will find that nearly all the building land is in the hands of that incubus on all improvement, the Ecclesiastical Commission. Let these lands be enfranchised on fair and equitable terms, not on their own valuation, and our critic "Gargoyle" will perhaps see, as in other places, the villas he speaks of. It is well sometimes to "see ourselves as others see us," and fair criticism is at all times useful; but I trust, sir, you will admit that we are not quite "benighted" nor so black as we have been painted.

CICESTRENSIS.

*** Even if we go so far as to admit the "not quite," we must still earnestly advise Chichester to set itself vigorously to the work of improvement rather than attempt to defend its present condition.

GRINDING MORTAR.

SIR,—Most of those who, like myself, are connected with the building trade, must have commented on the frequent insertion in architects' and engineers' specifications of a clause to the effect that the mortar used in the building *must be ground in a mill*. Now I should like to know if mortar so mixed is really better than if prepared in the ordinary way. I think it questionable. We know that in the best of lime there are certain hard lumps, unyielding to the water, and destitute of all the properties requisite for forming good mortar, which the men always throw on one side as unfit for use; whereas when a mill is used, these lumps are never extracted, but the lime, good and bad, is all shot in and mixed up together. Doubtless this method is not so wasteful and even more economical for the contractor, but is it calculated to produce as strong and durable work for the owner in whose interests I suppose the clause is inserted? A. B.

CHURCH-BUILDING NEWS.

Hutton.—The new church of Hutton has been consecrated by the Bishop of Rochester. The edifice is rebuilt upon the old foundations, save that the chancel is an extension over and beyond the ancient site. The building is entirely new, except that the old tower and porch have been restored. The former is done up with new oak shingle, and contains the old five bells, which have been rehung. The porch is of ancient oak carving, elevated on a new base, and restored in accordance with its former character. The edifice is in the Early English style, with flint walls and Bath stone dressings, and pointed arched windows, several of which are filled with stained glass by Messrs. Clayton & Bell. The interior is divided into chancel, nave, north and south aisles, and there is separated from the chancel, by a carved oak screen, a south chapel, and on the north side are the organ-chamber and vestry. The steps leading to the altar are in Mansfield stone, and the chancel and aisles are paved with Godwin's tiles. The roof is open-timbered, in oak, with oak boarding upon the rafters throughout the nave and chancel. Below the line of the east window the chancel is decorated with ornamental tiles. The seating is by means of plain oaken benches, and the evening lighting by brass candelabra. The woodwork was left as it came from the joiners' tools. The architect was Mr. Street, and the builder Mr. Cross, of Hutton. Mr. Wray, of Springfield, did the stonework for Mr. Cross. The cost of the building amounted to 2,500*l*., of which 2,100*l*. were subscribed prior to the opening. The whole expenditure will be about 3,000*l*., including more than a quarter of an acre of land, which the Lady of the Manor granted to make an addition to the burial-ground. The new portion has, with the old, been inclosed within a ring fence of oak. The stained windows referred to are six in number. The west window, representing the Annunciation, the Adoration of the Wise Men from the East, and the Presentation of the Infant Saviour in the

Temple, is the gift of Mr. Offin, of Hutton Park. That in the south aisle tells of the Conversation of Christ with the Samaritan Woman of Sychar, at Jacob's Well, and was presented by Mrs. Baker, the Lady of the Manor of Hutton. In the chancel aisle, in memory of two infant children, two windows have been placed by Mr. Johnson, of Hutton, one representation being that of the Virgin and Child, and the other the Good Shepherd; while the south window in the sacrarium, which represents the Visit of the Holy Women to the Sepulchre on the Morning of the Resurrection, was presented by the wife of the rector of the parish. The large east window, consisting of three lights, contains the representation of several of the principal incidents recorded in the story of the Crucifixion of our Lord, and seems to be an offering in memory of a pilgrimage to the Holy Land by the rector.

Frickley.—The church of the villages of Clayton and Frickley has been reopened after having been nearly rebuilt at the sole expense of Mr. W. Aldam, of Frickley Hall. The walls were cracked and rickety, the roof far from perfect, and the whole fabric in a very dilapidated and unsightly condition. Most of the walls have been rebuilt, the interior partly refitted, a new baptistery added, and, with the exception of the west end of the church and the ancient Gothic tower, most of the edifice is now entirely new. In the interior of the church the old Norman arch leading to the chancel is still preserved, but thoroughly cleaned. Two other ancient arches, said to be of the thirteenth century, also remain as in former years, but the south transept arch has been rebuilt. Most of the roof, particularly the portion covering the nave and part of the chancel, was found to be bad, and all has been restored. In carrying out the whole of the repairs the ancient style of architecture has been adhered to. A new baptistery has been added for the accommodation of the old font; the floor of the room being laid with encaustic tiles. All the south transept has been restalled, and the old pews made to look like new. The architect selected to carry out the work was Mr. G. Williams, of London, and the renovation was effected by Messrs. Anelay, of Doncaster. The cost of the whole was about 2,500*l*.

DISSENTING CHURCH-BUILDING NEWS.

Driffield.—The foundation-stone and some special bricks of a new Primitive Methodist Chapel and Schools have been laid, on a site recently purchased in George-street. The chapel is from designs by Mr. Wright, of Hull, architect, and will cost 4,000*l*. The contractors are:—Mr. M. Gage, bricklayer; Mr. T. T. Dickinson, joiner; and Mr. J. Hickson, stonemason.

Harlestone (near Northampton).—The foundation-stone of a new Baptist chapel has been laid at Harlestone. The old chapel and site was taken by Earl Spencer in exchange for a piece of land midway between the two portions of the village, and which is sufficiently large for the erection of a chapel and for a burying-ground. The plans for the chapel were prepared by Mr. Ingman, of Northampton, and the contract for its erection was given to Mr. G. Hall, of Hardingstone. It will be a plain, unpretending structure, built of the local stone; and, when completed, it is calculated, will afford sitting accommodation for about 150. Its floor measurement is 34 ft. by 24 ft. It will have an open roof; will be lighted by side, back, and front windows, which are to be filled in with green-tinted glass; and will have open movable seats, the object being to readily remove them, so that the space may be conveniently arranged for tea festivals. The total cost will be about 250*l*.

Bradford.—The range of buildings erected in Harris-street, for the congregation who have hitherto worshipped in Sion Baptist Chapel, Bridge-street, has been opened, with a public prayer-meeting, in the large school-room. The old chapel and schools were inadequate to accommodate the people and scholars, and hence the necessity for new buildings. The chapel and schools have been erected from the designs of Messrs. Lockwood & Mawson, Bradford. The chapel, which fronts to Harris-street, is in the Italian style, and in the rear are a large school-room and nine class-rooms. The proportions of the structure are large. The front is composed of Corinthian columns and pilasters, supporting an ornamental pediment, the tympanum containing the name of the chapel and the date when it was erected. A flight of steps leads to a roomy vestibule, in which are the gallery-staircases, and the entrances to the body of the chapel. Two other doors, at the ends of the vestibule, facilitate the means of entrance and exit. Two other staircases are also provided, by which the galleries can be gained from the rear. The chapel will seat upwards of 1,200 people. The fittings are all of pitch-pine, varnished, and the pews are so disposed that the whole congregation can see the minister. Above the baptistery is the pulpit, and the baptistery is so placed that as many people as possible can see the act of immersion. Behind the pulpit is the choir-gallery and a large recess for an organ. The chapel is well lighted. The front of the gallery is divided into panels, filled with ornamental ironwork, gilded. Light is gained at night from sunlights in the ceiling and from pendants under the galleries. The ceiling is panelled, containing ornaments, and round the walls run a frieze and cornice. The large schoolroom is lighted from the top and sides, and by the removal of sliding-doors a room at either end can be added to it. In the basement are the chapel-keeper's house, heating apparatus, and other conveniences. The entire cost will be about 18,000*l*. The contractors for masons' work were Messrs. Beanland; joiners, Messrs. Illingworth & Son; plasterers, Messrs. Howroyd,—all of Bradford. The chapel is surrounded by an iron palisading.

Books Received.

Professional Papers on Indian Engineering. 2nd Series. Edited by Major A. M. LANG, R.E. Nos. 7 and 8. London: Spon & Co. 1873.

THESE papers, printed and published at the "Thomason College Press," Roorkee, are issued quarterly, and if more particularly useful in India are interesting in England, as showing the subjects which occupy our engineer officers in India, and the progress of some of the public works. No. 7 has as frontispiece a photograph of the Mysore public office, Bangalore, designed by Lieut.-col. R. H. Sankey; and No. 8, one of the Delhi clock tower, designed and built by Mr. E. J. Martin, of the Rajpootana State Railway. Of the latter we have an engraving in hand, and will hereafter give some particulars of the work. The offices of the Mysore Government, at Bangalore, form a large building, with wings and a central block, in the whole 636 ft. in length. The contractors were Messrs. Wallace, Bumselal Abeerchund, and Narrainswamy Moodlear. The greater part of No. 8 is occupied with a "History of the Water-Supply of Bombay."

We have several works before us connected with India, particularly Lieut.-col Medley's useful lectures on "India and Indian Engineering," and Lieut.-col. Tyrrell's "Public Works Reform in India," and will find another opportunity to speak of them.

The architect and engineer must play important parts in India for a long time to come, and much will depend on the way in which they do so. Enormous interests are at stake.

On the Arrangement, Care, and Operation of Wood-working Factories and Machinery, forming a Complete Operator's Handbook. By J. RICHARDS, Mechanical Engineer. New York and London: Spon. 1873.

MR. RICHARDS is the author of a treatise on Wood-working Machines, noticed at some length in our columns at the time of its publication. That treatise is supplemented by the less expensive work now under notice, directed to the care and management of such machines, including the plans of arranging and equipping factories for wood-work, and particularly the details with which the practical workman has to deal. The work is mainly based upon American practice, but is by no means a compilation, this and the author's previous work being the first of their kind. The present treatise, moreover, is much more than a mere operative's handbook for the care and management of wood-working machines.

If wood-machine workers will only look into this volume, they will find something decidedly to their advantage. The information given is based on the personal experience of the author himself, and is not gleaned at second-hand from any other source.

Elements of Mineralogy. By JAMES NICOL, F.R.S.E., F.G.S., &c. Second edition, illustrated. Edinburgh: Adam & Charles Black. 1873.

THIS treatise, which contains a general introduction to the science of minerals, has been improved, in the present edition, as the author states, by new matter and careful revision and correction. The call for a new edition shows that it has been appreciated. In the last few years important additions have been made to the science of mineralogy. Its facts and principles are here stated in the simplest language which the author deemed consistent with scientific accuracy. It treats of the chemical as well as physical properties, and the crystalline forms of minerals, their classification, and a description of mineral species.

VARIORUM.

THE new part of the "Journal of the Royal Historical and Archæological Association of Ireland" contains an illustrated account of the ancient cemetery of Killeen Cormac, which until a few years ago had been unaccountably overlooked. An existing mound appears to have been triple-terraced and crowned by a primitive church. Before the introduction of Christianity, Killeen Cormac was used as a place of Pagan sepulture, evidences of which appear to remain.——The *Contemporary Review* is meant for the thinkers and searchers, and discusses all sides. Thus the September Number, while it contains an important article on the study of Sociology, by Mr. Herbert Spencer, includes another, signed St. George Mivart, to prove how very wrong Mr. Herbert Spencer's chief views are. Out of collision, the truth is to be hoped for.——The value of Hardwicke's *Science Gossip* is well kept up. The September Number contains some capital matter.——In the *Antiquary*, Mr. Walter Thornbury continues his accounts of London Riots. Those brought about by John Wilkes, 1763, are now engaging him.——The *People's Magazine*, the *Leisure Hour*, and the *Sunday at Home*, all contain their usual amount of safe and pleasant reading.——The principal story in *Cassell's Magazine*, "Hester's Promise," is gathering to an end, and with increasing interest.

Miscellanea.

Leeds Theatre Royal.—This theatre has been redecorated, papered, and painted. The new ceiling is elaborate. Round the centre light is a band of blue, from which spring twelve circles, each circle being cusped to a centre pattern, the points of the cusps studded with gold stars. The circles are again inclosed with a band of blue, bordered by red and studded by gold stars. The ground of the ceiling is a warm vellum, the whole being finished by a broad soffit ornament in green, red, and gold, on a blue ground. The square inclosing panels are in white and gold, picked out with red. The cove of the ceiling is diapered in vellum, chocolate, and red, springing from a band of leaves in green. The walls of the upper box-stalls are tinted a green shade, with Pompeian red dado. The walls of the private and family boxes are intended to be draped with crimson and gold curtains. The pit walls have been hung with a choice paper. The proscenium is in white and gold, with delicate tints of grey and warm red. The fronts of the boxes are decorated with a diaper of green quatrefoils and gold ornament. The box-entrance and staircase-walls are painted a delicate shade of green, and have a dado of chocolate and gold. The decorations have been carried out by Messrs. Wood & Sons, of Sherwood's Yard, Leeds, from drawings supplied by Mr. J. R. Watson, architect. Mr. James Wood, of St. Columba-street, has executed the general alterations.

Scarlet Fever from a Dead Horse.—Scarlet fever having attacked a whole family at the port of Amble, one of whom has died, Dr. Easton, the medical officer of health, has reported to the local authority his belief that the fever was produced from the family residing near a pond in an old quarry, in which was floating a dead horse. The family lived over a boat-house on the links, and being quite isolated, the fever has been confined to the inmates. Orders have been given to prevent dead animals being thrown into the pond.

Dyers' Hall Wharf.—The buildings here are approaching completion, and the *Metropolitan* gives some particulars. The land has a frontage towards the river of more than 100 ft., and a depth of 120 ft. Reckoning up the area of the stowage on the floors, which will probably be used for tea-warehouses on the upper stories, and for wine-vaults below, we get a total surface of two acres and a half. The works have been carried out under the superintendence of Messrs. H. & J. Eastman, architects, by the contractors, Messrs. Crockett & Dickenson. The basement is laid with asphalte, by Mr. J. A. Lawford, of Leadenhall-street. The public passage, with which many of our readers are doubtless familiar, as leading away from the landing-place of the river boats on the right, has been lined with white glazed tiles. As a metropolitan improvement of detail, we may recommend this course to many public authorities who have "dark entries" to deal with. The tiles were supplied by Mr. W. England, of Bury-street, Oxford-street. The iron girders and joists throughout were by Messrs. Homan & Rodgers, of Gracechurch-street. A contrast of colours in yellow and dark-red bricks marks the front; long piers of yellow bricks, with the windows intervening, and the space between head and cill fitted in with red; while round the pointed arches that surmount the various bays there runs a single line of blue Staffordshire bricks. The facing is of Medway gault bricks from the West Kent Company. The cast-iron columns required in the erection, weighing altogether about 350 tons, were from Mr. Thomas H. Head, of Cannon-street. The regulations of the new Act for constant supply by the water companies have been complied with by the adoption of fittings from Messrs. Tyler & Son, of Newgate-street; and some terra-cotta enrichments and decorations have been supplied by Messrs. Doulton & Co.

The St. Gothard Tunnel. — The route through this tunnel is designed to carry the traffic of Germany and Northern Europe to the Mediterranean by avoiding France, and, to further the project, Germany has contributed twenty millions of francs, Switzerland a like sum, and Italy thirty-five millions, the rest being made up by the shares of private individuals. Whilst the Mont Cenis tunnel is 5½ miles long, that of St. Gothard will be 9½ miles. The whole way from Göschenen to Amstäg will be one succession of bridges and viaducts. The workmen, mostly French and Italians, number at present some thousands, on both sides of the mountain; but it is hoped that shortly twice that number will be employed. The boring is conducted on exactly the same principle as it was on the Mont Cenis, and is worked, as there, by hydraulic power, which, however, is not yet strong enough. The line will be in working order, it is estimated, in seven years. The route will probably join the Italian system of railways at Camerlata, and the Swiss at Zurich, with a branch line to Lucerne, and the tunnel will pass exactly below the parish church of Andermatt. The project will, it is believed, completely eclipse the Mont Cenis route, for two reasons: first, because this will raise Brindisi to the level of Marseilles, and will shorten the journey to India; secondly, because whilst the Mont Cenis route has only a single line of rail outside the tunnel (the cause of endless blocks and unpunctuality), this will have two. The enterprise has nothing to fear but the opening of the Simplon route.

The Warwick Water-supply.—The borough surveyor, Mr. Pritchard, having prepared plans and a report, as engineer to the corporation for the Haseley scheme, Messrs. Cawley & Newton were appointed by the council to report on the scheme, and have now done so favourably, with some minor modifications. The two reservoirs and other works connected with Mr. Pritchard's scheme they state can be carried out at an estimated cost of 15,000*l.*, including land but not water privileges. Mr. Newton, who was present, complimented Mr. Pritchard on the excellence of his scheme. The supply will equal 300,000 gallons a day, or 25 gallons per head for a population of 12,000.

Ancient Ironworks.—An English gentleman has recently discovered, near the Wells of Moses, by the Red Sea, the remains of ironworks so vast that they must have employed thousands of workmen. Near the works are to be seen the ruins of a temple, and barracks for the soldiers protecting or keeping the workmen in order. These works are supposed to be at least 3,000 years old.

New Bowling-green at Heaton Chapel. New and extensive premises have been opened by the Bowling-green and Billiard Club Company, at Heaton Chapel. The premises are situated between Derby-road and the railway, the extent of the ground being about two acres. A bowling-green, measuring 60 by 50 yards, is separated in the centre of the grounds from the croquet lawn, by a border, planted with flowers, shrubbery, and young trees. On the side next the Derby-road, the premises are erected for in-door amusement. In the centre is a large pavilion for gentlemen, with billiard-rooms and refreshment-rooms. The left wing from the entrance is set apart for various purposes, card-rooms, &c., and the right wing will be occupied as a dwelling-house by the gardener. In the south-west corner, adjoining the croquet lawn, is the ladies' pavilion, and at each side are erected two strong gymnasiums, one for boys and the other for girls, the children of the subscribers. The opposite corner is set apart for a quoiting ground, a wooden enclosure surrounding the whole. The builders were Messrs. Davison & Mawdsley, Chorlton-upon-Medlock, and the grounds were laid out by Messrs. J. Yates, Dickson, & Co., of Stretford-road, Manchester. The whole of the work cost between 16,000*l.* and 17,000*l.*

Working Men's Club and Institute Union.—Mr. Buckmaster has delivered a lecture at the School of Cookery of the International Exhibition to the members of this union. The lecturer called attention to the preparation of the *pot-au-feu*. He had had prepared that evening a sufficient quantity of this dish to give 200 persons a good supper. This was the cheapest and most palatable way of preparing food for the people. He then showed how a good dinner could be made for a family of five persons, at a cost of 1s. 2½d.,—about 3d. each, the meat costing 6½d., vegetables 3d., potatoes 2d., bread 2d., and herbs 1d. The company partook of some of the *pot-au-feu*, a dish of tripe, onions, and potatoes, and afterwards some potatoes fried in the fat skimmed from the stew. Mr. Hodgson Pratt mentioned that, consequent on a meeting held at the house of the Marquis of Westminster, a national school of cookery had been formed, to which all classes were to be admitted.

Society of Arts Technological Examinations.—At these examinations, which have been held this year for the first time, the subjects selected being the manufacture of cotton, steel, carriages, silk, and paper, the examiners have reported favourably of the following candidates:—In steel manufacture, W. H. Warren, of Dublin, who obtains a first-class certificate, with a prize of 10*l.*, and the offer of a studentship of 50*l.*, given by Her Majesty's Commissioners for the Exhibition of 1851. In carriage building, T. F. Mullins, of Preston, who obtains a first-class certificate, with a prize of 5*l.*, and the offer of a similar studentship of 50*l.*; and M. Mullins and J. J. Heywood, who each obtain certificates and prizes. In cotton manufacture, Thomas G. Mills, of Longsight, near Manchester, who obtains a first-class certificate, with a prize of 5*l.* At the examinations of 1874 the same subjects will be continued, with the addition of glass manufacture, cloth, pottery and porcelain, and gas-making.

The Monument of Victory at Berlin.—The colossal Monument of Victory, on the King's-square, at Berlin, is now for the most part exposed to view. On a square sub-structure of dark-coloured granite, ornamented with relievos, stands a round hall in the shape of a temple, also of granite, the roof of which is supported by sixteen columns. Out of the centre of this rises the principal column, in the interior of which an iron staircase leads to the gallery around its top. Three rows of gilt pieces of cannon, taken in 1864, 1866, and 1870–71, connected by garlands of leaves, and crowned by wreaths of laurel, form the ornament of the shaft of the column, the capital of which is ornamented with eagles. Upon a socle stands the statue of Victory, a work of Professor Drake, elevating with the right hand a laurel wreath, and carrying in the left the victorious banner. The column measures 195 ft. Rhenish to the crown of the head of the Victory.

Grimsby Docks.—The construction of a canal to connect the Royal and the Old Docks at Grimsby has commenced. The work is of some magnitude, and will occupy two years and a half.

Trees in Piccadilly and Metropolitan Streets.—The vestry of St. George's, Hanover-square, have consented to a liberal offer of Mr. Barlow, a vestryman, to plant trees in Piccadilly, on the footway running from the Hyde Park Corner up to Arlington-street. The trees selected are planes, similar to those on the Victoria Embankment, and which stand the London smoke better than poplar or elm; in fact, the plane species are partial to soot, and the leaves keep green longer than the elm, which rots at the core, and becomes dangerous to life in high winds. The trees standing beside the roadway in Piccadilly were saved, as our readers may remember, through the *Builder*, some years ago. The example thus set in Piccadilly might very usefully be followed in other parts of London.

Freemasonry in Palestine. — The first Masonic Lodge has been organised in Palestine, the locality chosen being the Royal Quarry, beneath the city, from which may have been taken the stone for Solomon's builders. The *New York Herald* gives a long account of the ceremony, and adds,—"It has been demonstrated by instruments that the floor of this cavern is higher than the surface of the temple site, a quarter of a mile south, and as the great stones which still remain in the walls around Mount Moriah unquestionably had their origin in this quarry, much light is thrown by this fact upon the manner of moving them. The operatives had only to construct an inclined plane, and roll these blocks, which are 20 ft., 30 ft., and 40 ft. in length, down to their places."

Gift of a Park to Birmingham.—The Cannon-hill Park,—a gift by Miss Ryland to the town of Birmingham,—has been opened to the public. By the wish of the donor, there was no opening ceremony. The park covers sixty acres of ground, and has been laid out by Mr. Gibson, landscape gardener, London. Pools for boating and bathing have been provided. The deed of conveyance to the Corporation provides that no intoxicating liquors shall be sold within the park; that the boats shall not be used on Sundays; nor shall any bands of music be played, nor athletic exercises or games be permitted on that day. Miss Ryland has previously made several munificent gifts to the town, its churches, and charities. The value of this latest gift is over 30,000*l.*

Bricks and Mortar for Clapham Common.—The inhabitants of Clapham and suburbs are up in arms with respect to probably a well-grounded rumour that Clapham Common is to be handed over to speculative builders. The ponds on the common are now used as a receptacle for dead cats, dogs, and stinking fish, and no one appears to be responsible for the common, which has now become a "No Man's Land." Whether the "Inclosure of Common Land Commission" will stop the contemplated villas and streets is not yet known, and it is difficult to find out an owner nearer than the lord of the manor. If the common be dedicated to the parish, the latter certainly ought to keep the ponds clear of the abominations that poison the neighbourhood with fever and cholera.

The late Mr. Henshaw. — The will and codicil of Mr. William Henshaw, builder and contractor, of Nos. 13 and 15 Wharfs, City-road-basin, who died at his residence, Tottenham-lane, Hornsey, on the 13th ult., were proved on the 1st inst. by Messrs. Harriet A. Henshaw, the widow; Mr. G. E. East, Mr. S. Fletcher, and Mr. J. W. Clarke, the executors, the personalty being sworn under 40,000*l.* According to the *City Press*, the testator gives to his mother, Mrs. E. A. Henshaw, a legacy of 200*l.*, and an annuity of 50*l.*; he also gives an annuity to his wife's mother; to his wife he leaves 500*l.*, all his household furniture and effects, and one-third of the income of the residue for life; the residue he gives to his children.

St. Mewan, Cornwall.—Public elementary schools are being erected in this parish from the designs of Mr. Silvanus Trevail, architect, for the local School Board. They comprise a mixed school, 58 ft. 6 in. by 18 ft.; class-room, 18 ft. by 16 ft.; infant-school, 18 ft. by 16 ft., with the necessary cloak-rooms, offices, &c. Accommodation is provided for 180 children, at a cost of 852*l.* 13*s.*, including boundary walling, fittings, &c., complete. The style adopted is a plain Gothic. The bronze medal of the Royal Cornwall Polytechnic Society has been awarded to Mr. Trevail for his designs for the St. Colomb Central Board Schools.

New Process of Iron-making.—This process, which dispenses with the blast-furnace, has been practically tested, and specimens of its produce shown at Wolverhampton. The bloom is made direct from the ore, which, it appears, is ground, mixed with lime and pitch, and baked in a coke-oven. This is treated as pig-iron, and, a furnace being charged with it, it is ready for the helve or the squeezers in half an hour. The inventors claim that by their process they can make a ton of finished iron from the ore at an expenditure of only two tons of coal; that they can make German steel as cheaply as cast iron, and can, besides, make the latter equal in purity to charcoal iron.

Accident at Tay Bridge.—A fearful accident has occurred near Dundee. The North British Railway Company are engaged in the erection of one of the largest bridges in the world across the Tay at a point where the breadth is nearly three miles. Ten men were engaged at a set of columns which were being placed in deep water at a distance of about half a mile from the shore. The work was being done on the compression system, the water being excluded by the pumping of air into the cylinder. The upper portion of the cylinder suddenly gave way, and the water rushed into the aperture. The result was that six men were drowned.

Fungi in a Church Roof.—At the last meeting of the Royal Horticultural Society (Sept. 3), Sir Geo. Gilbert Scott sent a group of leathery fungi found growing from the interior of the roof of Croydon Church. They proved to be specimens of *Lentinus lepidens*, a species considered to be rare in this country until quite lately: it cannot grow without a good supply of moisture, so there can be little doubt of a serious leak in the roof. A year or two ago the *Builder* recorded the occurrence of this agaric upon the fir timber of railway bridges in Wales, and upon the sleepers of the North London Railway in London, where it has been again seen quite recently.—W. G. S.

Hall-marking of Jewelry.—The Council of the Society of Arts, learning that what is termed "Hall-marking" of jewelry and articles of gold and silver is inadequate to secure to the public that protection in the quality of the materials for which it is intended, have accepted the offer of one of the members, Mr. Edwin W. Streeter, to place 25*l.* at their disposal, to be awarded as a prize for an essay treating on this subject, with suggestions for an improved system.

The Painters.—Messrs. Pitman & Cuthbertson, in notifying to their workmen that on and after Friday, August the 29th, it was their intention to increase the pay of their journeymen one half-penny per hour, and the labourers one farthing per hour, said,—"We hope every one will take interest in his work, and exert himself to do his best, that the alteration may be to our satisfaction, and the increase of wages a mutual advantage." We should rejoice indeed if such were the result.

The Science and Art Department.—The number of persons who have during the year 1872 attended the schools and classes of science and art in connexion with the Department is as follows, viz.:—36,783 attending science schools and classes in 1872, as against 38,015 in 1871; and 244,134 receiving instruction in art, showing an increase upon the previous year of 31,633, or nearly 15 per cent.

The Hyde Park Memorial.—Mr. Foley's model of the Prince Consort statue, for the National Memorial, Hyde Park, is now completed, and will be forthwith executed in bronze. According to the *Art-Journal*, as a separate statue, it is grand in line, and regal in aspect and bearing.

Mr. Buckeridge.—The death is announced of Mr. Charles Buckeridge, architect, of Oxford and London, at the early age of forty.

TENDERS

For Blunham Rectory, for Rev. T. M. Berry. Mr. John Usher, architect. Quantities supplied:—

Twelvetrees	£2,627 0 0
Cunvin	2,544 0 0
Carter	2,470 0 0
Moore	2,421 0 0
Corby & Son	2,408 0 0
Hull	2,380 0 0
Foster	2,341 0 0
Moore	2,421 0 0
Spencer (accepted)	2,159 0 0

For the re-roofing and re-pewing of the parish church of Dumsbo, county of Down, Ireland. Mr. Wm. James Watson, C.E. architect, Newry:—

McCullough & Bennett	£852 0 0
Lennon & Millan	582 0 0
McKeown (accepted)	552 0 0

For alterations and additions to Gloucester-place, Portman-square, for Mr. H. Chatteris. Mr. H. H. Collins, architect:—

Clarke & Mannooch	£2,573 0 0
Longmire & Burge	2,782 0 0
Oliver	2,550 0 0
Vernall	2,406 0 0

For erection of a warehouse, Bury-street, St. Mary Axe. Quantities supplied. Mr. H. H. Collins, architect:—

Browne & Robinson	£2,937 0 0
Henshaw	2,919 0 0
Merritt & Ashby	2,887 0 0
Wicks, Bangs, & Co.	2,874 0 0
Ennor	2,695 0 0
Oliver	2,645 0 0
Newman & Mann	2,620 0 0
Kirk	2,568 0 0

For decorative works, Warrington-crescent. Mr. H. H. Collins, architect:—

Cohen (accepted)	£480 0 0

For decorative works to North London Synagogue, John-street West, Islington. Mr. H. H. Collins, architect:—

Oliver	£596 0 0
Ebbs & Sons	535 0 0
Clarke & Mannooch	527 0 0
Ball	383 0 0
Vernall	380 0 0

For Enfield Congregational Church. Messrs. Tarring, architects:—

		If Bath stone ashlar instead of stucco to inside walls:—
Myers & Sons	£8,175 0 0	£964 0 0
Shurmur*	7,313 0 0	817 0 0
Kilby	7,270 0 0	830 0 0
Brass & Co.*	7,260 0 0	830 0 0
Field & Sons	7,210 0 0	868 0 0
Patman	7,190 0 0	840 0 0
Hill & Sons	7,170 0 0	820 0 0
Luscombe	7,100 0 0	800 0 0
Dove Bros.	7,095 0 0	800 0 0
Jackson & Shaw	6,500 0 0	710 0 0
Bayes & Ramage	6,450 0 0	559 0 0
Perry & Co.	6,393 0 0	560 0 0
Cooke & Green	6,236 0 0	631 0 0

* Too late.

For alterations to 39, High-street, Marylebone, for Mr. Broadbent. Quantities by Mr. Charles Bradley:—

Rudkin	£737 0 0
Longmire & Burge	636 0 0
Perkins	609 0 0
Botting	606 18 4
Brown	585 0 0
Higgs	557 0 0
Harris & Son (accepted)	529 0 0

For Holy Trinity Schools, Hastings. Messrs. Jeffery & Skiller, architects:—

Howell	£1,987 0 0
Rodda	1,977 0 0
Vidler	1,894 0 0
Hughes (accepted)	1,833 7 5

For taking down and rebuilding No. 2, Moor-lane, Cripplegate, for Mr. Thos. Sadler. Messrs. Archer & Green, architects. Quantities by Messrs. Argent & Woodward:—

	General Works.	Repairing Stables.
Cooke & Green	£1,070 0 0	£135 0 0
Lathey Bros.	1,083 0 0	114 0 0
Bostell	1,068 0 0	112 0 0
Blake & Ramplen	981 0 0	116 0 0
Hearle	997 0 0	89 0 0

For repairs at the Duke of Marlborough, Richmond-road, Dalston. Mr. H. J. Newton, architect:—

Brindle & Co.	£236 0 0
Taylor	229 10 0
Shurmur	225 0 0
Hockley (accepted)	219 0 0

For repairs at the Jolly Anglers, Kentish-town. Mr. H. J. Newton, architect:—

Taylor	£140 0 0
Hockley	140 0 0
Shurmur	139 0 0
Brindle & Co. (accepted)	132 0 0

For alterations to Little Wyld-street Chapel. Messrs. Searle & Son, architects:—

	Chapel.	Gallery.
Feltham	£5,295 0 0	
Allan	3,199 0 0	£236 0 0
Linfield	2,980 0 0	270 0 0
Cook	2,661 0 0	
Battley	2,560 0 0	
Cohen	2,450 0 0	130 0 0
Allard	1,969 0 0	155 0 0
Horne	1,823 0 0	
C. A. Cook	1,166 0 0	70 0 0

For rebuilding No. 32, Walbrook, City. For Mr. James Smart. Mr. James Harrison, architect. Quantities supplied:—

Ashby & Sons	£4,832 0 0
Little	4,657 0 0
Merritt & Ashby	4,644 0 0
Colls & Son	4,611 0 0
Killby	4,556 0 0
Browne & Robinson	4,547 0 0
Ennor	4,480 0 0
Williams & Son	4,395 0 0

For alterations to No. 1, Baker-street, Portman-square, for Messrs. Cobb & Son. Mr. Alfred Wright, architect:—

Longmire & Burge	£480 0 0
Botting	475 0 0

For alterations at No. 48, Elizabeth-street, Eaton-square, for Mr. D. A. Key, jun. Mr. James Harrison, architect. Quantities supplied:—

Little	£577 0 0
Aitchison & Walker	525 0 0
Merritt & Ashby	518 0 0
Watson Bros.	512 0 0
Ennor	488 0 0

For the erection of new Deaf and Dumb Asylum at Margate. Messrs. Drewe & Bower, architects. Quantities supplied by Mr. C. A. Gould:—

	If executed in Bath Stone.	If executed in Ransome's Patent Stone.
Brass	£20,987 0 0	£21,366 0 0
Bushell & Son	20,067 0 0	21,146 0 0
Dove Bros.	19,975 0 0	20,975 0 0
Rider & Son	19,768 0 0	19,988 0 0
Downs & Co.	19,315 0 0	19,807 0 0

For rebuilding No. 23, King-street, Hammersmith, for Mr. Angell. Mr. Edmund Woodthorpe, architect. Quantities supplied by Messrs. Welch & Atkinson:—

Perry Bros.	£1,620 0 0
Hill & Sons	1,589 0 0
Adamson & Sons	1,565 0 0
Pritchard (too late)	1,540 0 0
Turner & Son	1,519 0 0
Larke	1,447 0 0
Chamberlen Bros.	1,447 0 0

For erection of premises at Circus-road, St. John's-wood, for the London and South Western Bank. Quantities supplied by Mr. Henry Lovegrove. Mr. C. Bell, architect:—

Tavener & Son	£1,919 0 0
Nutt	1,789 0 0
Bracher & Son	1,750 0 0
Barford	1,683 0 0
Scrivener & White	1,606 0 0

For additions to Aubrey House, Notting-hill, for Mr. W. C. Alexander. Mr. T. E. Collcutt, architect. Quantities by Mr. J. Gandy:—

Dove Bros.	£2,983 0 0
Hill & Sons	2,884 0 0
Macey	2,870 0 0
Jackson & Shaw	2,825 0 0
Cooke & Green	2,816 0 0
Ennor (accepted)	2,805 0 0

For a pair of semi-detached villas on the Lynn-road, Wisbeach, Cambridgeshire, for Mr. Henry Hudson. Mr. Alfred Wright, architect:—

Challans	£1,400 0 0
Girling	1,200 0 0

For new road-sewers, curbs, &c., for the Palatine Estate, Stoke Newington. Mr. William Reddall, architect:—

Crockett	£2,150 0 0
Peach & Sons	2,105 0 0
Tay	2,099 0 0
Jackson	1,900 0 0
Keeble	1,714 0 0
Chick & Co.	1,680 0 0
Bloomfield	1,548 0 0
Pettigrew & Moyes	1,454 9 0
Marshall	1,430 0 0
Meston	1,317 8 9
Goddard & Nicholson	1,306 9 0
Goodair	1,253 10 0
Capper	1,248 1 5
Dover & Co.	1,197 8 9
Potter	1,138 0 0
Riley	1,112 0 0
Gardner	1,053 0 0
Taylor	1,050 1 4

For alterations and additions to No. 13, Somerset-street, Portman-square. Mr. J. H. Rowley, architect. Quantities not supplied:—

Sharpington & Cole	£820 0 0
Wagner	795 0 0
Boyce	668 0 0
Vaughan	532 0 0

For alterations and additions to farm-house at Beddenham, Beds. Mr. John Usher, architect:—

Carter	£1,130 0 0
Foster	949 0 0
Cunvin	875 0 0
Moore	861 0 0
Hull (accepted)	840 0 0

For church to be erected at Havant, for the Rev. E. Rearden. Mr. John Crawley, architect:—

Moore & Son	£1,690 0 0
Nightingale	1,688 0 0
Bullivant	1,629 0 0
Stallard	1,603 0 0

For alterations and additions at the North Surrey District Schools, Anerley. Mr. A. G. Hennell, architect. Quantities supplied:—

Peskett & Taylor	£14,960 0 0
Smith	13,998 0 0
Hollidge	13,500 0 0
Crockett	12,911 0 0
Williams & Son	12,578 0 0
Axford	12,360 0 0
Hill & Sons	11,980 0 0
Willson Bros.	11,876 0 0
Rider & Son	11,823 0 0
Cooke & Green	11,811 0 0
Wright Bros. & Goodchild	11,375 0 0
Browne & Robinson	10,130 0 0
Downs & Co.	9,990 0 0
Moore	9,009 0 0

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